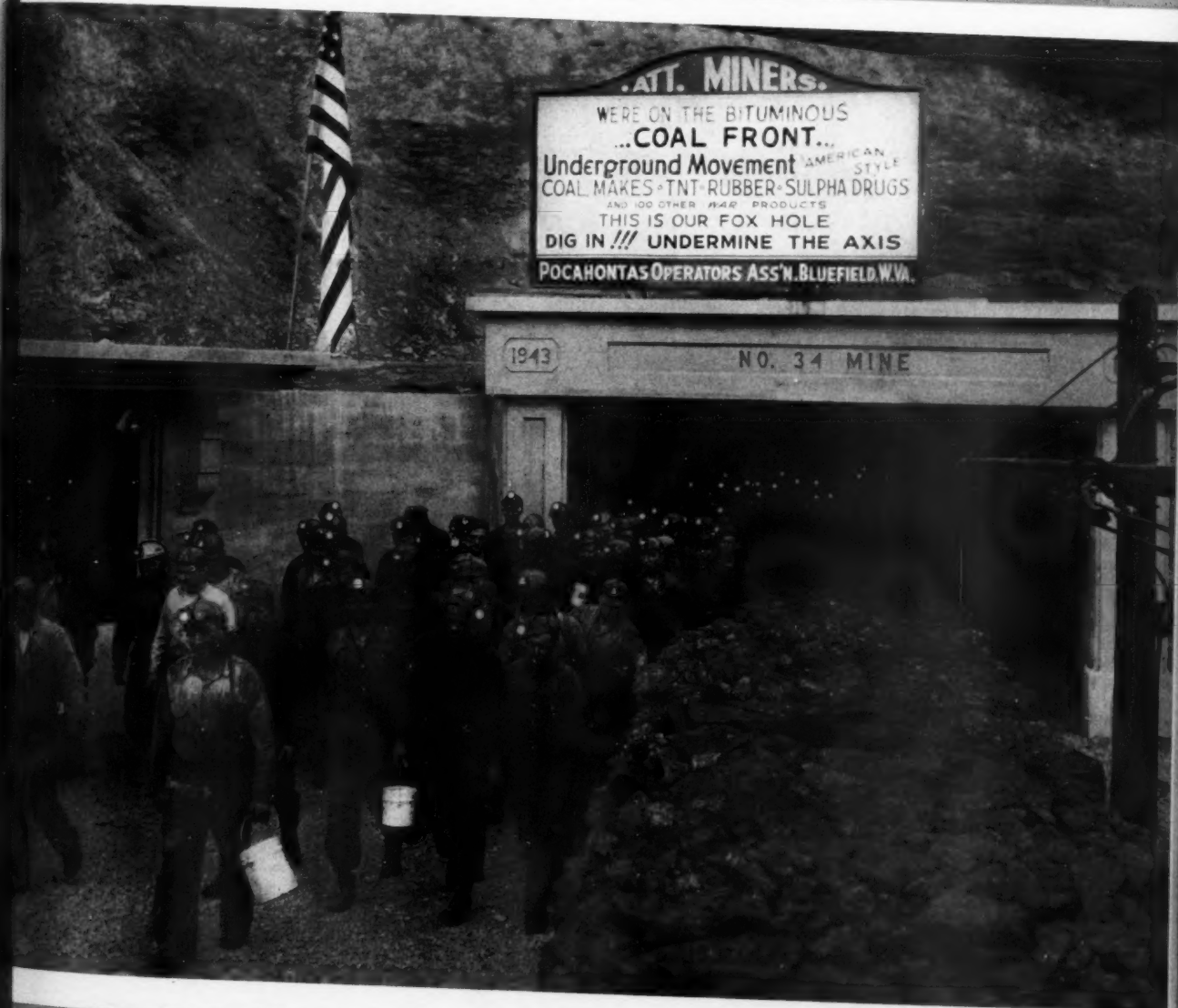


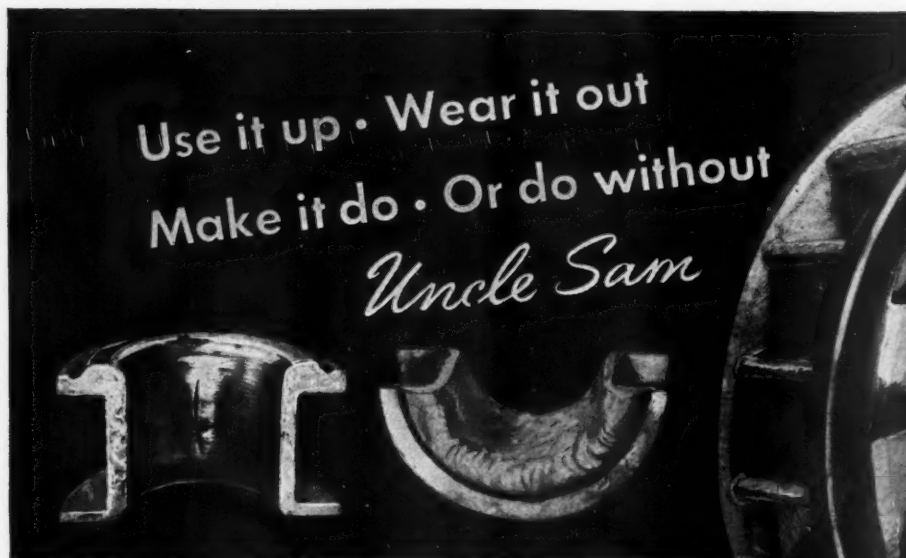
Mining

CONGRESS JOURNAL



OCTOBER
1944





Use it up • Wear it out
Make it do • Or do without
Uncle Sam

No need to "do without" — Bronze Welding is Industry's No. 1 Tool for Salvaging Worn Parts

For building-up worn surfaces or making repairs to cast iron, malleable iron, steel or copper alloy parts, there's nothing so economical and dependable as Bronze Welding. That large bearing, for instance: It was worn out giving years of service on a nail making machine. Replacement from stock was impossible, yet the manufacturer just couldn't "do without." Built up with strong, tough, dense-grained Anaconda Manganese Bronze Welding Rod and machined, the bearing was quickly returned to service.

Or that 5,000 hp. turbine runner: Stones and gravel brought in with ice in the Spring badly damaged some of the buckets while others were broken off completely. Again Bronze Welding was used to build up the worn surfaces and weld in new patches. The cost, compared with that of a new runner, was negligible.

Maintenance men everywhere are taking advantage of the salvage and repair opportunities made possible with the oxy-acetylene torch and such rods as "997" Low Fuming, Tobin Bronze* and other Anaconda Welding Rods. Applications of these rods are described in Anaconda Publication B-13. Write for a copy.

*Reg. U. S. Pat. Off.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury 88, Connecticut • Subsidiary of Anaconda Copper Mining Company

In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.

Here's a Suggestion List

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"make it do"

- Sheaves
- Pulleys
- Clutches
- Thrust Plates
- Bushings
- Bearings
- Hubs
- Flanges
- Pistons
- Impellers
- Pump Parts
- Pipe Threads
- Stripped Holes
- Gear Teeth
- Reciprocating Parts
- "Safe-ending" Hammer Struck Tools



Anaconda Bronze Welding Rods

Mining

CONGRESS JOURNAL

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COVER: Shift of bituminous coal miners at Bishop, W. Va., coming out of their "fox hole," showing sign they erected in an effort to surpass the 1943 output. (Hamilton Wright photo)

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Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress.

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NEW DI-DAPPER NOCK-OUT

Unlatching Device Announced For Automatic Cars

Operators Agree it is the Greatest Improvement Since the Invention of the Automatic Drop-Bottom Car.

THE PAST twenty-five years have seen revolutionary changes in coal mining, due mainly to the constant improvements in mechanical equipment. The greatest improvement has come in the transportation of coal from heading to storage bins. This change is, no doubt, largely accountable for the development of many of the other implements used in producing coal. It accounts also for many of the modern methods used in mining today.

Twenty-seven years ago, the first automatic drop-bottom mining cars were introduced to the mining industry by Sanford-Day Iron Works. This was, without question, the beginning of a new era for mining. With this new type of mine car, new records of production and new records in the profits of operation quickly developed. The S-D Automatic Drop-Bottom Mine car proved, at once, that the mines using this new type of equipment could produce much more coal with less manpower, and thus increase profits greatly.

Throughout these twenty-seven years Sanford-Day engineers have worked constantly to improve the design of the S-D Automatic Drop-Bottom car, so as to increase the profits from the use of this type of car—and constantly cheaper operations have resulted.

The goals have been chiefly these: Man-less dumping—foolproof operation—greatest possible capacity for any given over-all dimensions—elimination of needless dead weight—smooth running, long lasting trucks—saving in lubrication cost—saving in the cost of electricity used in haulage—maximum reduction in cost of maintaining cars—reduction of coal breakage to the minimum. All of these results have been accomplished by the persisting effort of the engineers of the Sanford-Day Iron Works.

One of the outstanding improvements in the S-D "Automatic" was the 1-2-3 method of discharging the coal from the car. This kept breakage of



Fig. 1. The single action S-D Automatic Di-Dapper Unlatching Device as car passes over it.

the coal to the minimum. The S-D 1-2-3 "Automatic" has the important advantage over other bottom dumping cars in that it does not dump all of the coal through all doors at one time. In fact, the S-D 1-2-3 "Automatic" does not actually dump the coal. Rather, it lays the coal down gently through one door opening at a time upon the bed of coal directly underneath so that the coal does no real dropping. Also the bin is filled to the top from one end to the other—and automatically. This feature not only reduces the breakage of coal, but its easy operation lengthens the life of the cars.

New "Nock-out" Device

Probably the greatest improvement in the automatic drop-bottom car since its invention, and its first production by Sanford-Day, is the new S-D Automatic Di-Dapper "Nock-out." This is an automatic nock-out unlatching device. Operators who have seen it in use are most enthusiastic about its simplicity, safety, and value.

This new "Nock-out" device is available in two types. One is electrically operated and is shown in Figure 3. The other—the Automatic Di-Dapper type is shown in Figures 1 and 2.

The S-D Electrical "Nock-out"

Figure 2 shows the S-D Automatic Nock-out mechanism which is raised to its unlatching position by the operation of the electro-magnet, or solenoid, which is shown directly under the car bumper. The proper timing of this electrical operation is accomplished by the wheels of the car, which close two switches to create a closed electrical circuit when the car has reached a certain point. The Nock-out mechanism falls out of the way after the hooks have been unlatched.

The S-D "Di-Dapper Nock-out"

The S-D Automatic Di-Dapper is the simpler nock-out device, and is therefore preferred for most installations. In Fig. 1, the photograph shows the mine car just after it has passed over the S-D Automatic Di-Dapper

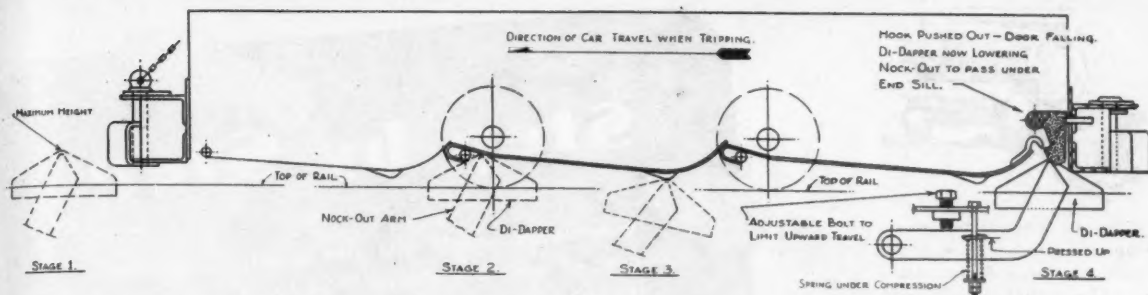


Fig. 2. This line-drawing illustrates the S-D Automatic Di-Dapper Nock-out mechanism as it passes under an S-D 1-2-3 Automatic Drop-Bottom Car having three doors. Stage one of the drawing shows the mechanism just before the forward bumper depresses it. Stages 2 and 3 show the mechanism passing gently underneath car. At stage 4, the mechanism automatically rises (by the action of compressed spring) to a point where it engages the forward faces of the door-supporting latch hooks. Each car has two such mechanisms, and each mechanism automatically comes into contact with one of the latch hooks and forces it back positively into its unlatched position.

Nock-out mechanism. The door latch-hooks are now in their unlatched position. The picture shows a single Di-Dapper controlling the two separate arms whichnock-out the two latch hooks. Our standard practice however, is to provide two independent Di-Dappers. Under Fig. 2, a clear explanation is given of the operation of the S-D Automatic Di-Dapper Nock-out mechanism.

Outside Mechanism Eliminated

All of the conventional outside tripping mechanism has been eliminated from the car. The old-fashion latch-lever arm which extended beyond the side of the car, and which had to be raised by hand or by some mechanism alongside of the track has been done away with. No protruding lever arms to be bent in collisions, etc. remain. The Automatic Di-Dapper Nock-outs at the bin unlatch the two independently-operated catches from underneath the cars. Two latches are now provided instead of the former single latch hook. This promotes greater safety. Two years operations have proved the extraordinary value of this new unlatching mechanism. The first 100 cars equipped with this automatic latch were put in use in August 1942, and hundreds of others have been installed since. Operators using it say that it makes the S-D 1-2-3 Automatic Drop-Bottom Car absolute perfection for transferring coal.

Emergency Unlatching

In some installations it is necessary to discharge certain cars containing slate or rock while en route to the tippie. To do this, the selected cars may be tripped by hand in the manner shown in Fig. 3. The hand operation is very simple. On the contrary, if

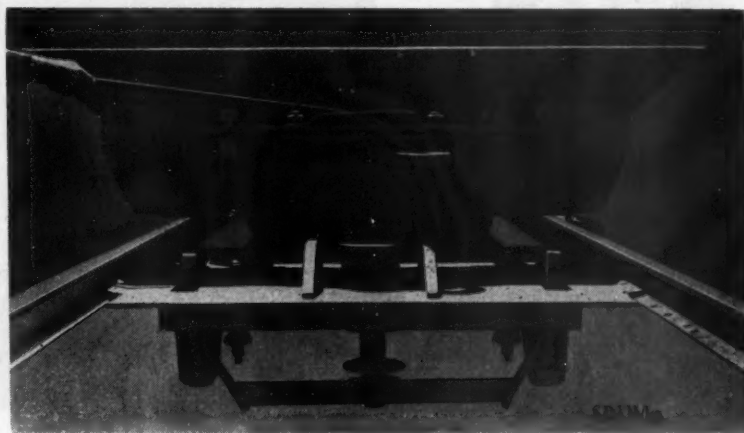


Fig. 3. The S-D Electrical Nock-out Unlatching Device operated by electro-magnet.

cars of slate are to pass over the coal bin without discharge, the knock-out mechanism can be lowered by hand so that certain cars will pass over the bin without being discharged.

Write us, and we will tell you all about these new trouble-savers, speed-uppers, and super-safety devices. We will tell you where you can see them in operation. The Pruden Coal & Coke Co., of Pruden, Tenn. got the first 100 cars. One of the largest producers of coal who uses S-D "Automatics" with great satisfaction, and also with great savings, in more than 5 mines, recently said that he wouldn't consider using anything else from now on except a Drop-Bottom car which can be unlatched by a practical "Nock-out" unlatching device. And, we have just

this sort of mechanism, tested and proved.

BUT FINALLY, AND ABOVE ALL: S-D 1-2-3 "AUTOMATICS"

The greatest savings, after all, comes from using S-D 1-2-3 Automatic Drop-Bottom cars rather than rotary or end-dump cars. We say this although we also make a full line of maximum capacity rotary and end dump cars. If you wish, we will send you histories of coal mines where end-dump and rotary cars have been scrapped, and where new S-D 1-2-3 Automatics have been installed in place of them. The savings made by these mines as taken from their book-records, were from 20c a ton to 57½c a ton. This ignores the reduced break-age of coal.

Sanford-Day Iron Works

KNOXVILLE

TENNESSEE



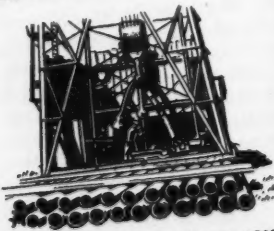
For the new dump trucks, shovels, compressors, locomotives, or the various other heavy-duty construction and material handling equipment you are planning to buy, specify Cummins Diesel power. Practically all of the leading manufacturers offer this diesel as optional equipment.



In the Northwest Woods, Cummins Diesels do the complete job—from show to siding. They power yarders, loaders and tugs . . . trucks that handle up to 240,000 pounds (three carloads). In this service, Cummins Diesels are the symbol for "cheap logs."



In the commercial fishing fleets of the Pacific, Atlantic and Gulf coasts, and in all types of work boats and pleasure craft, Cummins Marine Diesels—propulsion engines and generating sets alike—have become a byword for dependable, low-cost performance.



In the vast Mid-Continent area, the world's greatest oil producing territory, Cummins Dependable Diesels power more rotary and cable tool drilling rigs and oil well service units than any other make of diesel engine.

Step by Step

Tremendous weight and size greatly limited the uses of early-day diesels. Twenty-six years ago, the builders of Cummins Diesels decided to do something about that—and did! Step by step, and with each step first tested and proved on the job, they simplified design . . . improved construction processes . . . turned to lighter, stronger materials . . . steadily boosted the rpm. That, briefly, is the story of the modern Cummins Diesel . . . the original high speed diesel that, since 1932, has won its spurs on the toughest, heavy-duty jobs . . . in virtually all types of heavy-duty equipment, automotive, industrial, marine. For tomorrow, continued refinements in diesel manufacture promise a Cummins Dependable Diesel that will do your job still cheaper, still faster, still longer. So plan now to standardize on Cummins Diesel power for the equipment you will build or operate after the war. CUMMINS ENGINE COMPANY, INC., Columbus, Indiana.



**CUMMINS
DIESELS**

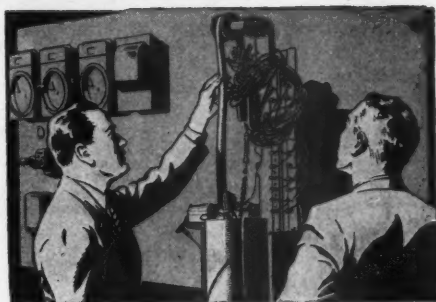
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THROUGH HIGH SPEED DIESELS

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That is why Mine Operators and Locomotive Designers can specify U. S. Royal Mining Machine and Locomotive Cables with absolute confidence whenever they want balanced construction, flexibility, dielectric strength, smoothness of finish, and long trouble-free service.



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MINING MACHINE AND LOCOMOTIVE CABLES

UNITED STATES RUBBER COMPANY

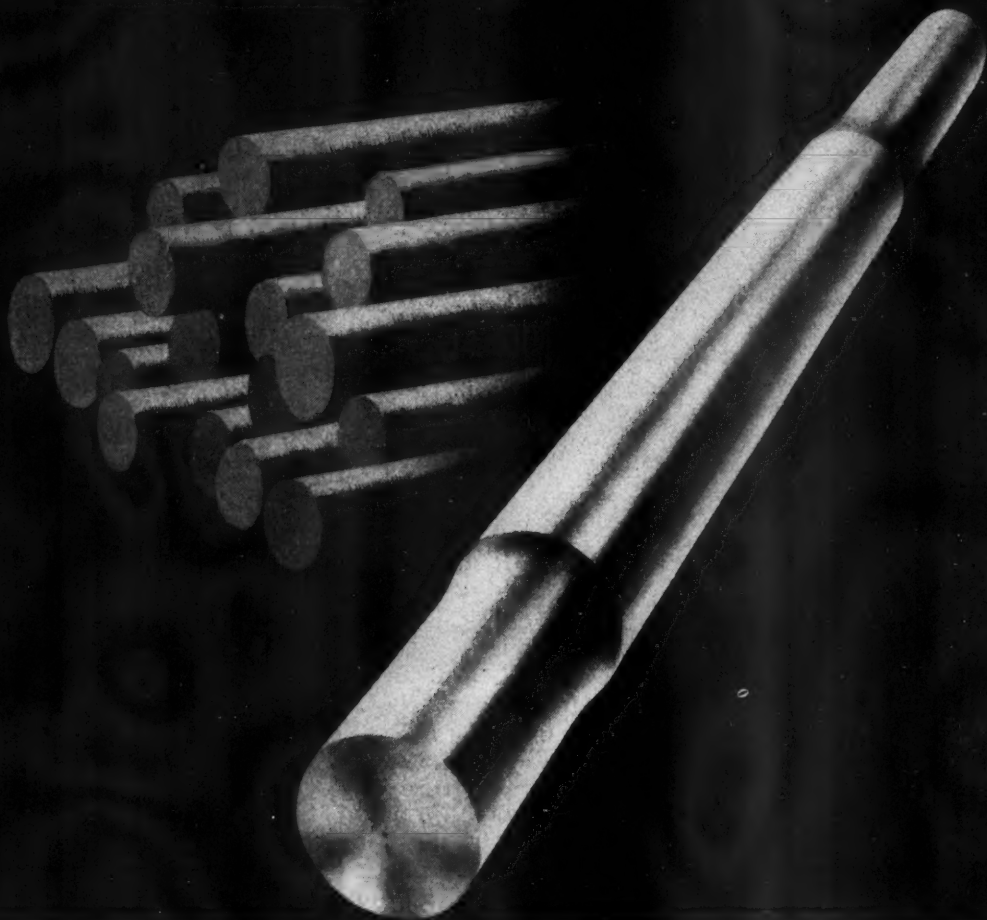
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[Page 5]



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wipe out the money
saved by buying carbon
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steel shafting.**



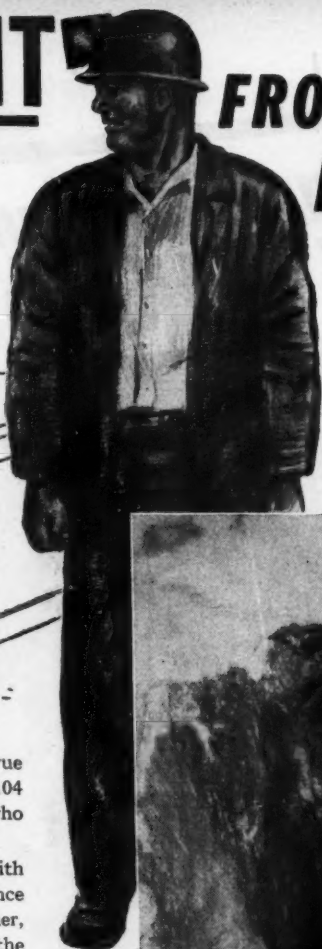
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He'll tell you that it's "tops" with him . . . that he likes its better balance . . . that the drill, not the drill runner, fights a tight bit. He'll tell you that the push button makes feed control easy . . . that he can get more work done with the R-104.

FOR EXAMPLE, HERE IS A TYPICAL DRILL RUNNER REPORT:

"Drilled 280 feet in 8 hours foot drilling . . . a record for our mine."

ANOTHER:

"Just finished a 200-foot raise. Stoppers never left the face and are in perfect condition. Starting another raise and with those same R-104's."

The R-104 is equally popular with operators. They like its low maintenance features . . . the fact that the automatic system of air cleaning ejects all sludge and water from the steel and front end of the drill. They like the extra power of the R-104 . . . plenty of extra power for faster drilling.

To lower your operating costs . . . to speed your drilling, get the facts about this self-rotating stoper. Write Gardner-Denver Company, Quincy, Illinois.



GARDNER-DENVER Since 1859



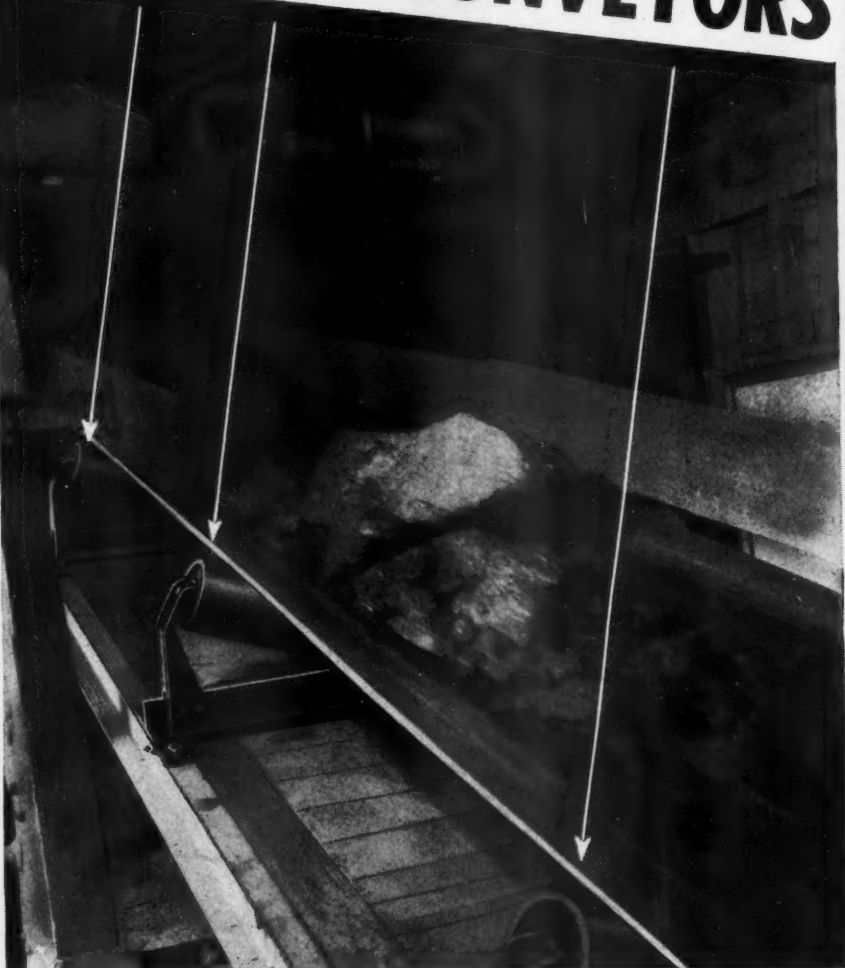
Efficient, High-Capacity Handling with LINK-BELT BELT CONVEYORS

YOU can be assured of maximum belt life, minimum power and maintenance cost, and dependable trouble-free service with Link-Belt Anti-Friction Belt Conveyor Idlers and other equipment.

Link-Belt engineers pioneered in the development of anti-friction belt conveyor idlers and have consistently improved the original, fundamental design—the grease seal, bearing adjustment, shaft mounting and the supporting stands and brackets. All with the result that today's Link-Belt designs offer the very best in belt conveyor equipment to keep production "On the Move" for Victory.

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Minneapolis 5, Cleveland 13, New York 7,
Kansas City 6, Mo., Indianapolis 6,
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Los Angeles 33, Seattle 4, Toronto 8,
Vancouver.



36" wide belt conveyor equipped with Link-Belt type "70" troughing idlers and type "71" return idlers, handling mine run ore from mine ore bin to vibrating grizzly and picking belt at the rate of 100 T.P.H. Conveyor is operated by a Link-Belt Motorized Speed Reducer and Silverlink Roller Chain Drive.

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*is Safer
... Longer!*

When lives and loads are at stake, you want assurance of safety. Tuffy takes care of that, regardless of strain or weight. Tuffy stands for toughness—the durability of union-formed (pre-formed) wire rope.

Tuffy withstands abrasion longer, withstands the bending and crushing customary in your operations and is easier to handle, because flexibility is built-in, and any strain on wires is eliminated in the pre-forming. No wonder thousands of operators declare Tuffy is the answer to the most vexing problems in machinery lines—that Tuffy is the safe, economical rope to install.

Tuffy ends for mining machinery are union-clipped for easier installation.

UNION WIRE ROPE CORPORATION
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Tulsa Houston Chicago Salt Lake City New Orleans
Monahans, Texas Portland, Ore. Ashland, Ky. Atlanta

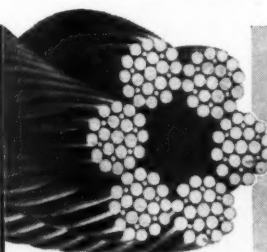
Tuffy never wears Fringe...

Men handle worn Tuffy ropes as safely as a brand new line, as broken outer wires lie close to the rope — don't fringe out into daggers to pierce hands or to damage adjacent wires.



For Two Years
of Team-work with
Our Armed Forces

union-formed
IS
PRE-FORMED



union
Wire Rope

"THE ULTIMATE IN LOW COST WIRE ROPE"

LESSONS IN NON-METALLIC CONCENTRATION

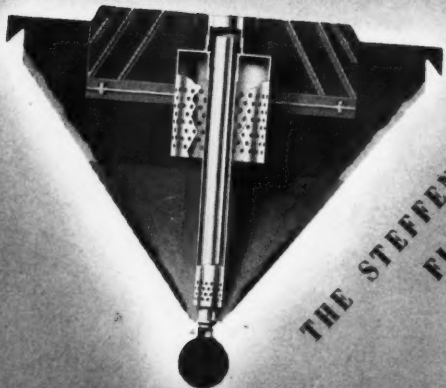


FIFTEEN YEARS of Florida Phosphate flotation experience has conclusively demonstrated that low-value concentrates can be treated economically . . . that rigid specifications can be held on high-tonnage output . . . that this high efficiency can be achieved with very low capital-investment.

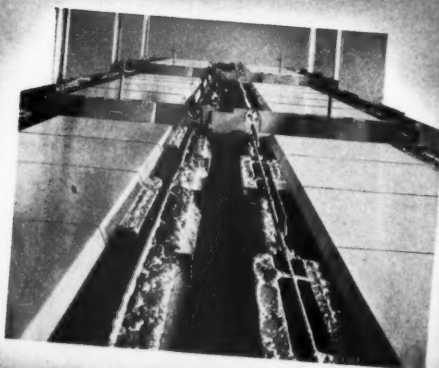
In Florida Phosphate recovery . . . largest of all non-metallic processing operations . . . Cyanamid has long occupied the unique position of being *both* the operator of a very large property *and* a supplier of flotation machines and reagents. Thus, Cyanamid has had unusual opportunity for concurrently conducting research, testing and large-scale commercial operation . . . to try various reagent combinations and machines . . . to acquire an operator's first-hand knowledge of results and costs seldom available in the same degree and over so long a period to any supplier of flotation machines and reagents.

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AMERICAN CYANAMID COMPANY



THE STEFFENSEN
FLOTATION MACHINE



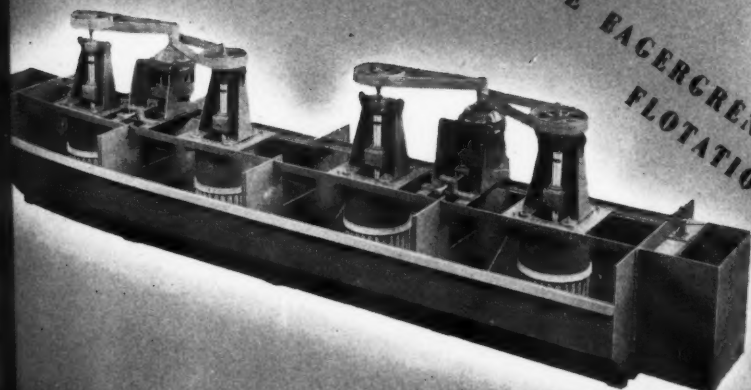
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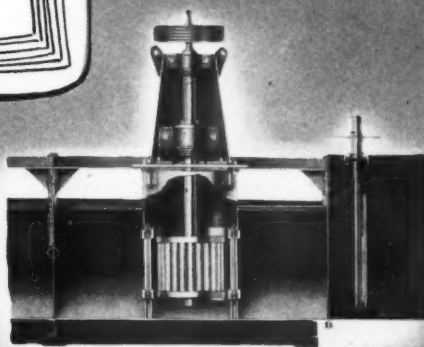
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Because of both the scope of our experience and the line of machines, processes and reagents offered, Cyanamid is in a position to render constructive, unprejudiced counsel backed by the facilities of the Cyanamid Ore Dressing Laboratory and the practical helpfulness of Cyanamid Field Engineers in helping you achieve low-cost results on commercial operation. Your inquiry for additional information is invited.

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Charge Them From Off-Peak Power

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The charging can also be done direct from the d-c power lines through suitable resistors, because alkaline batteries do not require critical adjustment of the charge rates.

Yet this is only one of the operating advantages of alkaline batteries. Their steel cell construction successfully withstands rough usage. Their electrolyte is an alkaline solution that is a natural preservative of steel. Their electrochemical principle of operation is free from self-destructive reactions. As a result, they stay on the job and out of the repair shop; give longer service life than any other type of battery; cut annual operating cost.

*Edison Storage Battery Division
of Thomas A. Edison, Incorporated,
West Orange, New Jersey.*

Edison
ALKALINE BATTERIES



Typical 80-Cell Locomotive Battery



The alkaline battery in this trammer is regularly charged through a resistor from the d-c power supply on the level where it operates.

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KEEP WORKMEN OUT OF **DANGER ZONE**

Protect your investment
in production man-hours
---- reduce lost time
accidents by installing
O-B Automatic Couplers.

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Coupling Operations

Cars couple
automatically
upon impact.

---- Uncoupled
by raising con-
venient lever
safely located
on outside cor-
ner of car.

**STEADY...RELIABLE DRILLING -
AT LESS COST!**

WITH
AUTOMATIC ROTATED

Thor STOPERS

For the *reliable drilling* and *quick servicing* that gets narrow vein stoping jobs started and keeps them moving, Thor Stopers are the choice of operators everywhere! Thor automatic rotation provides the sure, steady drilling operators count on. Separate Thor construction of parts most frequently replaced provides quick changes that save time and slice upkeep costs.

LOW OPERATING COST. Low air consumption provided by special Thor Valve design puts every ounce of air that enters the machine to work! Positive automatic lubrication of all parts keeps the drill running smooth, steadily... prevents stalling or clogging.

LOW UPKEEP COSTS. Threaded chuck separate from the retainer body can be easily and quickly replaced - yet it is always a tight seal that prevents cuttings from entering working parts of the drill. The feed rod point and bearing, too, are separate parts that can be quickly replaced. Also contributing to low upkeep is Thor rugged steel construction and special heat treating of all parts for durability.

LOW COST PER HOLE. With *dependable* automatic rotation powered by use of every ounce of air entering the machine, every stoping job is done faster, cleaner... more holes are drilled per shift!

For complete information and specifications on Thor Stoper Rock Drills and associated Thor mining and contractors' air tools write today for Catalog 42-A.

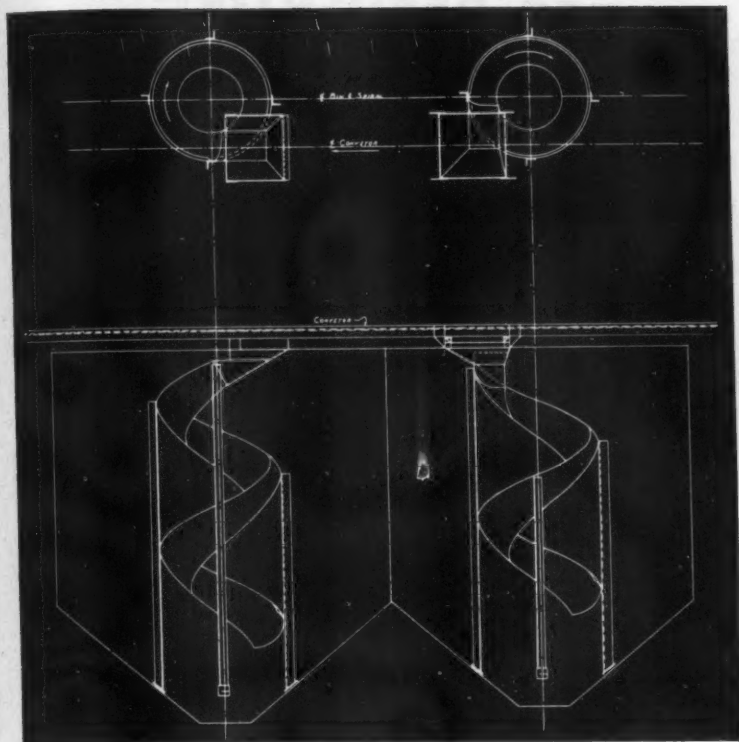


An exclusive feature of Thor Stoper Rock Drills is the time and money saving "Swing Feed Cylinder" which makes it simple and easy to change a water tube right on the job without removing the machine from the operation.



Thor Portable Pneumatic and Electric Tools
INDEPENDENT PNEUMATIC TOOL COMPANY
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AVOID BREAKAGE *with*



Holmes

Lowering

Spirals

The advantage of Holmes' spiral over previous chutes of this nature lies in the design of the carrying surface, which is formed much as the bowl of a race-track, having no retaining wall on the inside edge. Elimination of this inside edge allows the material to slide gently onto the peak of the pile without droppage. By the same token, the peak of the pile may be carried around the interior of the bin in such a manner that the material is deposited in overlapping layers, where the problem of segregation is present.

Design is such that the lowering speed of the material is automatically retarded when it begins to exceed a safe limit. Regardless of the distance the material travels, its velocity remains uniform; and it reaches the bottom in a continuous, even stream.



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PRODUCT OF PHILCO BATTERY RESEARCH!**



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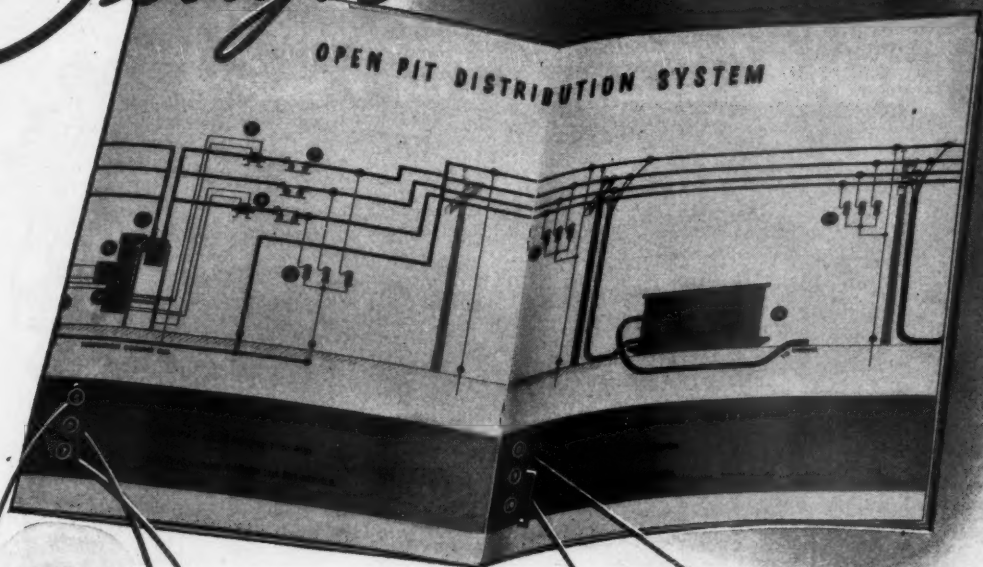


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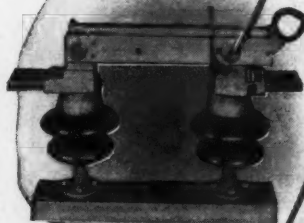
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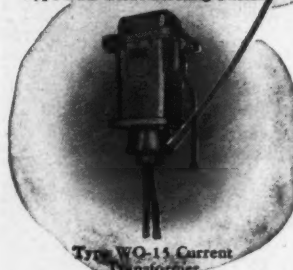
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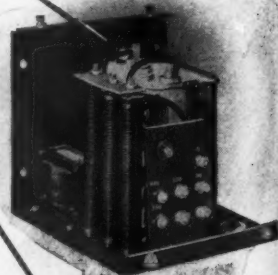


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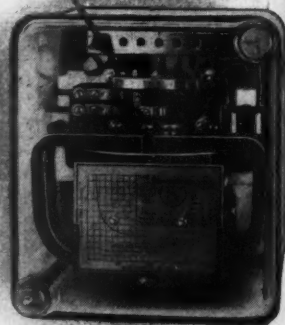
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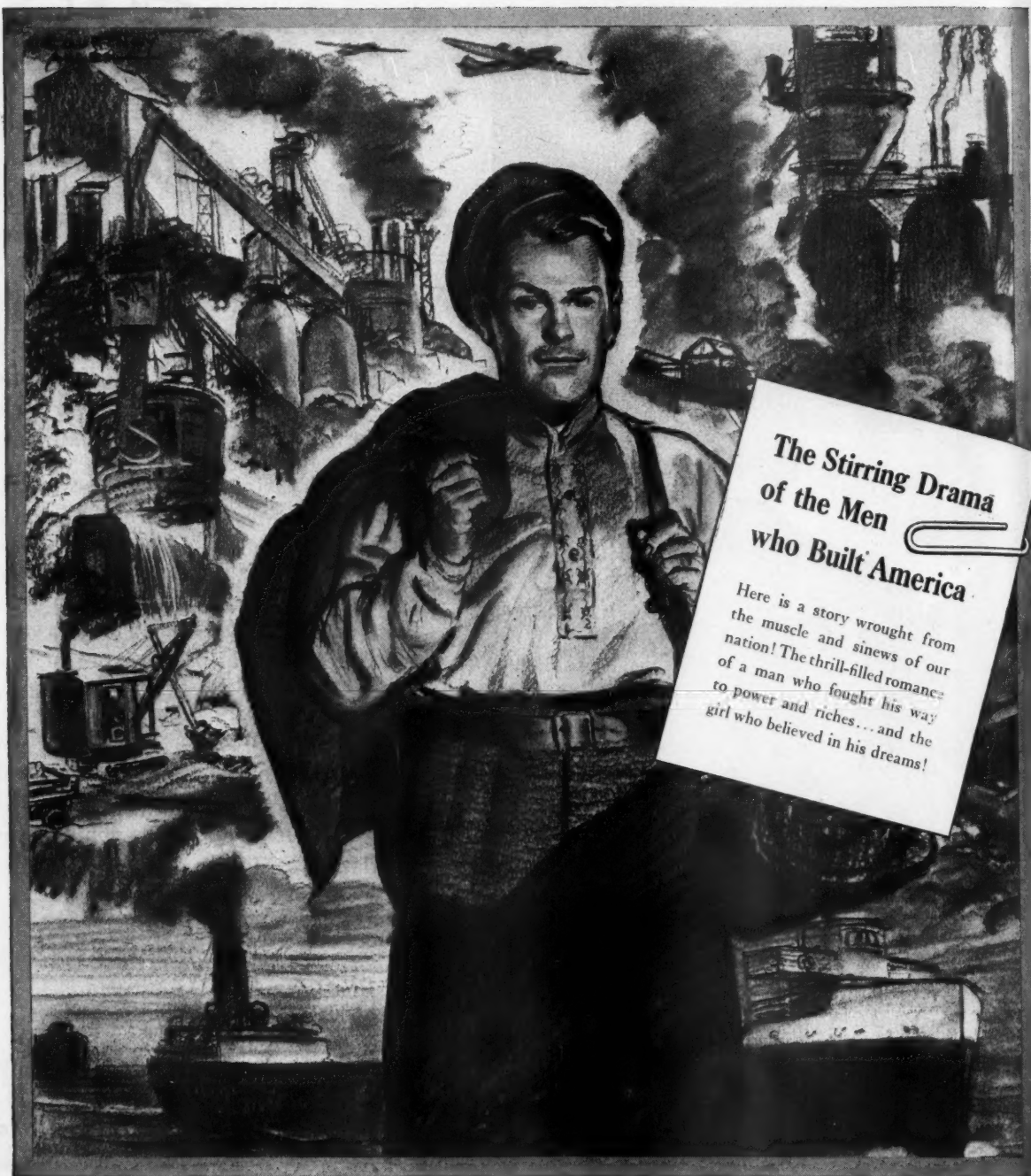
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[Page 15]



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Mining

CONGRESS JOURNAL

Published for the Entire Mining Industry
by The American Mining Congress

S. A. TRENGOVE, Editor

Volume 30

OCTOBER, 1944

Number 10

Metal Mine Employment—Postwar

THE degree to which American metal mines can participate in, and contribute to, our future economy depends upon a broad group of factors. These were pointedly summarized in the Report of the Western Governors Mining Conference (MINING CONGRESS JOURNAL, September, 1944). The report offers definite evidence that metal mining in this country possesses all those elements needed to maintain it as one of the nation's greatest economic and military-economic assets. It has the natural resources, the mining talent, and above all—it has them *here in America!*

The war has been pretty tough on all of our mines. Some have left the picture through complete exhaustion of reserves. Others have given up their high-grade ores to better serve the common good; their operators must now rely on leaner ores and improved concentration facilities, or shut up shop while they seek new mines. Many have fallen behind in needed development work through sheer lack of manpower. The gold miners as a group have been reduced to idleness by Government edict.

On the other hand, some new orebodies have been discovered and we have added value to our mineral reserves through important technological advances. We have the fullest confidence in the successful future of American mining. However, we continually run into those "have-not" theorists and international economists whose suggested course of action might throttle American mining operations down to a slow crawl and stop some of them permanently.

Employment in this country stood at about 46,000,000 in 1940 and has now increased by some 20,000,000 (if we include those in the armed forces). Probably 60,000,000 people will desire employment after the war. Allowing for those remaining in the armed forces and for temporary unemployment, there is in prospect an employment level of about 55,000,000—estimated to be capable of producing an annual income of \$140,000,000,000. Such a high level is extremely desirable from industry's standpoint, to create markets for products and services, and to carry and reduce our huge national debt.

The mines are as much a part of this post-war

American picture as they are of the present one. But, in that eagerly awaited era, they must be given every possible opportunity to keep up their properties and ore reserves, to carry on adequate development programs, and to work in the spirit of free enterprise. Finally, they must enjoy optimum privileges in supplying American mine products to American industry so as to provide the maximum number of jobs for American miners.

The Long-Range View of Mine Modernization

MURMURS in the press, of recent date, have pointed to a source of unrest among coal miners which could very well lead to a serious setback in the coal industry. We refer to the worry expressed over the effect on employment of increasing mine modernization. The situation is one which is admittedly best solved through the united efforts of all concerned.

From the viewpoint of all of us, one thing stands clear—a single machine can replace several men. And, if this were the sole consideration, we might well lay down our pen and forget the whole argument, at least during periods of serious unemployment. There is involved, however, a much bigger factor, based on what machines can do to preserve the coal industry, as such. In the post-war world, coal faces important and powerful competition. If full recognition is not taken of this, a large section of its current markets will be placed, perhaps permanently, beyond reach. The inroads made by oil and gas are already startling. Coal *must* meet the challenge of these important rivals.

On page 23 of this issue, we present a concrete example of the superiority of "machine" over "hand" methods. Much the same thing is exemplified in the article on page 36. The evidence at hand is overwhelmingly in favor of modernization when survival is threatened.

To us, the picture is something like this:

The battle for coal superiority embraces two equally important objectives, viz., (1) the cheapest possible production of the raw product, and (2) offering the consumer the most saleable finished product from the standpoint of efficiency and low cost. Two major approaches, worked out together, can bring about the desired result: (1) Mine modernization, as a means of keeping the industry alive and at a high level of activity, and (2) research programs calculated to encourage the use of coal.

Like two great armies, in fighting combination, these endeavors on the part of coal men are capable of holding the line, and somehow we have a strong feeling that they will! If either fails or lags too far, however, the loss in employment will certainly be greater than that to be expected from thorough-going mine mechanization programs.



"Solid Fuels at War" portion of the Fuels and Lubricants exhibit in the office of the Quartermaster General, Washington, D. C.

THE War Department is today one of the world's largest buyers of coal, without taking into account the tremendous quantities purchased by private concerns operating War Department facilities, and the even larger quantity that is required for the production of the implements, materials, and supplies of war.

The direct purchases of coal by the War Department in recent fiscal years have been as follows:

1939	525,725
1940	579,556
1941	1,651,901
1942	3,110,331
1943	8,544,586
1944	10,807,369

The War Department, due to the fact that its peacetime purchases had to be made on the basis of competitive bidding, had, at the beginning of the war, little or no so-called "good will" upon which to draw in covering its greatly expanded requirements for coal. In addition, it was belabored at the outset by cumbersome peacetime procedures for inspection, receipt, and payment, which did not lend themselves to wartime conditions. It is not surprising, therefore, that the War Department found itself severely handicapped in obtaining supplies of coal in competition with privately operated war industries.

The responsibility for meeting this problem rested with the Quartermaster General whose duty it is to supply to the Army all of those materials and supplies that are common to more than one arm or service. The first step taken by the Quartermaster General was to bring into his organization men from the industry having broad experience in the distribution of coal. Then, in order to decentralize operations, the Quartermaster General

The War Department and Coal

The Quartermaster General has secured the services of experienced coal men, has established coal depots of experienced coal men, has established coal depots and has undertaken programs of maximum coal production in Alaska, North Africa and Sardinia

established coal purchasing units in five strategically located Quartermaster and Army Service Forces depots which were convenient to the area that they served, to the coal pro-

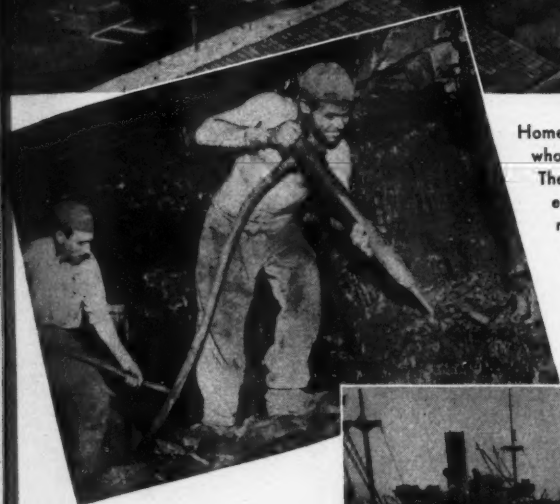
ducing fields from which they were to draw their supplies, and to the Ports of Embarkation through which supplies of coal were to be transshipped to overseas destinations. The depots so



Suntrana Mine—Healy River Coal Corporation, Suntrana, Alaska



Homes and gardens of the miners who work at Carbonara, Sardinia. The neat, well-planned project begun by Mussolini's regime, is being put to good use by the allies



Compressed air picks are used in the selective mining of the six seams of coal. Seam thicknesses are variable



Small diesel locomotives are used for hauling coal trips at Carbonara



Coal is brought to ship-loading cranes on flat cars which carry five coal buckets each



Left: Sardinian women, both young and old, are employed in picking operations



Right: Sardinian miners use hand-lanterns instead of cap-lamps

- ACME PHOTOS



Modern coal washery at Serbariu



Coal train haulage between Carbona and San Antioco



A timbered haulage way at Serbariu



Miners' showers are modern and attractive



Shaking conveyors are used extensively



Left: Chute-mouth details at Serbariu

Right: Haulage way in good ground





Major General Edmund B. Gregory, Quartermaster General



Officers of Solid Fuels Branch, left to right: 2nd Lt. Charles B. Lakin, formerly of Berwind-White Coal Mining Company, Chief of Inspection Section; Captain H. M. Jones, formerly of Amherst Fuel Company, Chief of Purchase Section; Captain B. G. Jordan, formerly of Alabama By-Products Coal and Coke Company, Assistant Chief of Branch; Lt. Colonel C. R. Mabley, Jr., formerly of Island Creek Coal Sales Company, Chief of Branch; Major (now Lt. Colonel) J. A. Bowers, formerly Consulting Mining Engineer, Salt Lake City, Utah, Chief of Plans Section; Captain G. A. Wallace, formerly of Bituminous Coal Division, Chief of Requirements Section



Brig. Gen. Howard L. Peckham, Q.M.C. Director, Fuels and Lubricants Division

selected were the Jersey City Quartermaster Depot, Jersey City, New Jersey; the Atlanta Army Service Forces Depot, Atlanta, Ga.; the Chicago Quartermaster Depot, Chicago, Ill.; the San Antonio Army Service Forces Depot, San Antonio, Texas; and the Seattle Army Service Forces Depot, Seattle, Wash.

These depots were immediately staffed with officers and civilian personnel having experience in the coal industry. In the meantime the staff of the Quartermaster General undertook to streamline purchasing methods, contract terms, and procedures within the War Department, to the maximum extent permitted under the First War Power Act and other existing legislation. The results are a matter of history, and it is sufficient to say that doing business with the War Department today is as satisfactory and free of red tape as doing business with any large private concern.

Alaskan and Foreign Production

The increased scope of military activities and the rapid expansion of the area of the war soon emphasized the necessity for the development of local coal production in those areas as a means of conserving the water-borne shipping required to supply the coal needed overseas for utilities purposes at fixed installations, for the military operation of railroads, and for minimum civilian needs. The Quartermaster General, acting for the War Department, has, therefore, sponsored and undertaken programs for obtaining the maximum coal production from mines in Alaska, North Africa, Sardinia, and those enemy occupied countries that it is contemplated will be occupied in the further prosecution of the war. The available data on the coal deposits and the coal industry of those areas was, however, very limited and before definite programs could

be initiated, considerable research, largely in documents of foreign languages, was required to develop the information needed for this purpose. The reports prepared as a result of these studies have, furthermore, become accepted as the basis for post-war civilian planning of coal production in those countries.

The productive capacity of the coal mines of Alaska has been increased 100 percent as the result of these efforts so that ample productive capacity is now available to meet emergencies that may be encountered in the future as the result of mine explosions and/or mine fires such as have occurred in this area rather frequently in the past. This means that the interior of Alaska has now been made self-sufficient as to coal supply and that the shipping required to supply coal to that area has been released for other purposes.

The production of coal in North Africa has been increased approximately 50 percent above that existing at the time of the liberation of that

area, thereby reducing the coal that must be imported into that area to meet military and civilian needs.

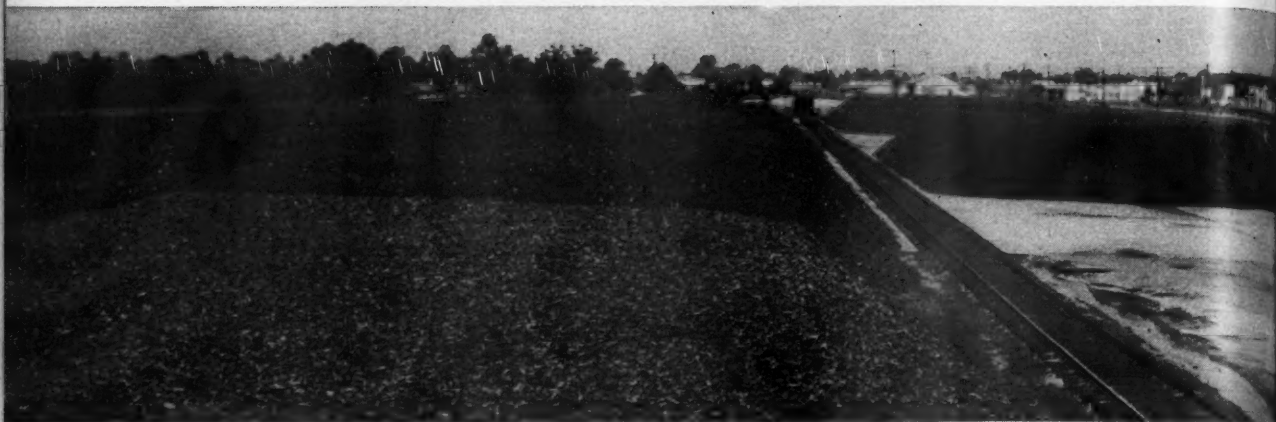
The production of coal in Sardinia has been increased 1000 percent above that existing at the time of occupation of that area.

The support of the War Department has been given to the programs of the Combined Coal Committee for increasing production in the United Kingdom, South Africa, and India as a means of overcoming the world shortage of coal and of conserving world shipping by increasing the production of coal in those areas from which coal can be supplied at minimum shipping cost to meet world needs. In the case of South Africa, exportations of coal have already been increased more than 100 percent. In addition, there have been noticeable improvements in the coal production of the other countries mentioned.

The minimum requirements for civilian use in liberated countries and enemy occupied countries that will be occupied or liberated in the progress of



Jonesville mine, Evans-Jones Coal Corporation, Jonesville, Alaska



Coke, egg and stoker coal storage at Camp Croft, Spartanburg, S. C. Coal piles are 18 to 20 ft. high and are piped for temperature readings

the war have been estimated and provided for in connection with the foregoing programs. The work of establishing these requirements was a considerable problem in itself as there was very little available data on the subject, and extensive research by the Office of The Quartermaster General was required to obtain basic data for this purpose.

It is estimated that the requirements of coal for War Department consumption in the United States will be somewhat less during the ensuing year, but the problem of supplying coal for military and civilian uses overseas will become even more complicated as military operations progress.

The Fuels and Lubricants Division

of the Office of The Quartermaster General, which is charged with the responsibility for supplying fuels—liquid and solid—petroleum products, containers and dispensers therefor, to War Department activities throughout the world has recently established a "Fuels and Lubricants Exhibit" in that office for the training of military and civilian personnel. This exhibit contains every known kind of visual aid, including talking moving pictures, demonstrating the production, distribution, testing, and utilization of the aforementioned products and equipment for the support of military activities. The picture of the section devoted to solid fuels accompanies this article.

The work of the Office of The Quar-

termaster General in respect to coal has been under the immediate direction of Lt. Col. C. R. Mabley, Jr., Chief of the Solid Fuels Branch (formerly of the Island Creek Coal Sales Company), assisted by Captain B. G. Jordan, Assistant Chief of the Solid Fuels Branch (formerly of the Alabama By-Products Coal and Coke Corporation), and under the guidance of Brigadier General Howard L. Peckham, Director, and Colonel Jay L. Taylor, Deputy Director of the Fuels and Lubricants Division, Major General C. L. Corbin, Director of the Procurement Division, and Major General E. B. Gregory, The Quartermaster General, whose combined efforts have been responsible for the success of this work.

Army Officers, with Long Coal Industry Experience, Assigned to Eisenhower Staff

TWENTY Army officers, all with long experience in the coal industry have been assigned to the staff of General Eisenhower and have gone to the European Theater of Operations to assist local authorities and supervise in the rehabilitation of coal mines and distribution systems in liberated and occupied territories in order that the demand on coal from the United States and the United Kingdom will be lessened.

Twelve of the group have been connected with mining enterprises in this country and eight in the distribution and utilization field. Four of them, Quartermaster officers, were returned from Alaska, where the Army has been supervising production of coal, to go on the European mission. All 20 took an orientation course conducted by the Solid Fuels Branch, Fuels and Lubricants Division, Office of the

Quartermaster General, before leaving.

The group will serve as a coordinating field staff in the European Theater. Its mission will include lending technical assistance to national authorities in repair of mines which have been damaged, reassembly of managerial and supervisory forces, recruitment of labor to work the mines, and assistance in making available mine equipment and supplies, either from this country or the United Kingdom. The specific mission of the eight officers in the distribution group will be the coordination of local production with imports for military and civilian use.

Engineer troops will be used in the field in a supervisory capacity, and equipment and supplies will be provided by the Engineer Corps until such time as the mines are able to install civilian equipment. Over-all di-



Col. R. P. Koenig, president, Ayrshire-Patoka Collieries Corporation, is head of this Army group

rection of the program will be vested in the national authorities in whatever countries the mines are located, with the cooperation of the staff of 20, brought together for this task from widely scattered former assignments.

A Wartime Coal Development

SOUTHERN Illinois is one of the oldest coal producing fields in the United States, dating back about 100 years, and it has a long record of accomplishment. As mining evolved during this period from hand to machine methods the operations in this field kept pace with every modernized movement and in fact lead in one of the greatest developments—mechanical loading. In the late 1920's when complete mechanization was regarded as having a rather limited application by the coal industry as a whole, Illinois did not share this opinion but started in on a real program of mechanization, trying out all the various types of equipment that were then available. The development progressed rapidly and as early as 1933, Illinois produced over ten million tons of coal with mobile machines; more than was loaded mechanically by all the other states combined. This pioneering work pointed the way and made possible the wide-spread adoption of machine methods that later took place throughout the industry and the direct result today is that our coal mines have reached tonnage records that have enabled our country to manufacture the tremendous quantities of material needed to win the war.

Company Keeps Modernized

One of the leaders in mining modernization was—and is—the Consolidated Coal Company of St. Louis under the direction of its president, W. J. Jenkins. This company was among the first to completely mechanize with mobile loaders and to raise the machine production to an economically sound level. It also has the record of being the first in the United States to use 10-ton mine cars underground and has made a further valuable contribution to mining by participating in the development of the belt conveyer slope for bringing coal to the surface from a mine car dump underground. During the past ten years this company has progressively modernized its several mines and it is of interest to note that each successive installation has introduced new features, which have been based on the experience gained in their previous operations. In other words, the official staff members have never felt that they have reached the ultimate goal in production performances and they are continually devising improvements in equipment and operating technique that serve to increase the efficiency.

The Lake Creek Mine of Consolidated Coal Co. in Illinois, which has just gone into operation, is thoroughly modern and incorporates the experience of a number of years of successful mechanized operation

By G. B. SOUTHWARD

Mechanization Engineer
American Mining Congress



Engine room and waiting room are located directly over slope opening

New Plant Layout

The company's newest operation, which is designed primarily for wartime tonnage, is the Lake Creek Mine located in Williamson County about 8 miles east of Herrin, Ill. This is a belt slope that has just gone into production although the plant construction is not yet entirely completed. The underground layout and surface arrangements are, as previously stated, based on several years of operating experience with mechanical loading and the installation is thoroughly modern in every phase. The difficulty of obtaining all new material has necessitated the employment of considerable used equipment which was transferred from some previous operations and in several instances this situation has necessitated modification in the plans from what was really desired and first proposed. The complete lay-

out, including all surface buildings, tippie structure, the slope belt and the preparation facilities were designed by the members of the Engineering Department of this company, under the direction of G. S. Jenkins, Assistant General Manager, and the equipment, both new and used, was installed according to their specifications.

The coal is the Illinois No. 6 seam and in this area its quality is up to the usual high standard. The area has been thoroughly prospected by core drilling which shows a seam height of about 7 ft. with fairly uniform grades and generally favorable mining conditions are indicated. The cover varies from 200 to 300 ft.

Belt Slope Has Excellent Facilities

The seam is reached by a slope opening driven down on a grade of 15 deg. No particular difficulties were encoun-



The new lay-out utilizes straight-line shuttle service from the face to panel entry. Mother conveyor takes coal to hopper



A Joy loader was employed in excavation of the open cut for upper portion of slope

tered in the sinking, which was done with a Joy machine loading into a 4-ton car that was pulled to the surface by a rope hoist. The slope was driven 19 ft. wide and has two compartments separated by a concrete curtain wall; a belt way and a hoist way with track that will be used for supplies and man trip. The belt section is 8 ft. wide and the hoist section is 10 ft. wide, the height in both cases being about 10 ft. Concrete lining was installed to bedrock but from there on down no further lining was necessary. The belt way has a concrete floor throughout its entire length and has adequate clearance on both sides for inspection and oiling. At 20-ft. intervals along the entire length, doors are placed in the curtain wall

to provide easy access into the belt way from the hoist section.

The total length of the slope is about 1,200 ft. from the surface; however the bottom is 95 ft. below the coal seam in order to provide for a large underground dump bin. This is concrete lined with a capacity of 2,000 tons; the sides angle in and down at 45 deg. to a reciprocating plate feeder that loads the belt. This bin is filled from the top by drop-bottom mine cars that discharge in a solid trip pulled across by the main line locomotive. The general plan for the slope bottom is very similar, except in bin capacity, to the installation at this company's Buckhorn mine that has been in successful operation for the past six years.

The belt is 36 in. wide furnished by the U. S. Rubber Company and operates at a speed of 450 ft. per minute with a capacity of 450 tons per hour. The slope is too long for a single belt operation and the belt is installed in two sections, the top section 784 ft.—and the bottom section 726 ft., center to center between head and tail pulleys. There is of course some overlapping at the transfer point which is half way up the slope. Each belt is operated by two Westinghouse motors set in tandem—a 50 h.p. and a 125 h.p. at 2,300 V.A.C. The head-ends are of the Joy Manufacturing Company design, incorporating Link-Belt speed reducers, all conforming to the Fire Underwriters approved specification. At 60-ft. intervals along the belt line, both on the load and return strands, are spaced self-aligning idlers designed by the Robins Conveyors, Inc.

The hoist way has a track for man trip cars and will also serve to take supplies into the mine and bring to the surface, machines and parts for repair. The hoist is a Lidgerwood operated by a 75 h.p. General Electric motor with G. E. controls; these have automatic stops and automatic speed regulators.

The power control for the main belt is operated by one push button with interlocked and integrated starting in the following sequence: first, the magnetic tramp iron collector at the head pulley on the tippie; second, the top length of belt; third, the bottom length of belt; and fourth, the reciprocating plate feeder at the main dump bin underground.

Underground Operation is Fully Mechanized

The mine cars are the Sanford Day steel drop-bottom type and have a capacity of 11 tons. Provision has been made in the car design for a later installation of sideboards, if desired, that will increase the capacity to 15 tons. As previously stated, this company was the first to use mine cars of 10-ton capacity and the operating staff is thoroughly sold on the idea of large cars underground.

The mining system is to be the conventional room and pillar method with Joy 11-BU loaders and Lee-Norse 6-ton shuttle cars discharging onto a gathering belt. The shuttle conveyor can be elevated at the discharge end for direct loading onto the belt without the use of any intermediate device or transfer station. The coal is undercut with a Sullivan Shortwall mounted on a Joy caterpillar tractor. Drilling is done with Chicago Pneumatic electric post drills.

In mining, the shuttles will bring the coal from the room faces to the entry where a 30-in. gathering belt will be installed. The panels are to be 2,000 ft. long and the belt head will discharge into a trip of mine

cars at the main haulage at the mouth of the panel. The loaders and the shuttles will be operated through trailing cables.

New Layout Calls for Shuttle Car Gathering

The general plan for the panel operation was, as already stated, based on a number of years experience with various haulage arrangements, such as mechanical loading into mine cars; mechanical loading onto room chain conveyors which discharged to belts or large capacity cars; shuttles with transfer stations to mine cars. Mr. G. S. Jenkins in his paper read before the 1944 Coal Mine War Conference of the American Mining Congress in Cincinnati gave a general resume of the results of these various haulage methods and discussed the plan to be used at Lake Creek as follows:

the tail pulley of course has an empty belt while cars discharging between this point and the head pulley may have to wait until an open place in the belt comes along. This is not a serious delay, as the cars tend to stagger themselves and any tendency to diverge from this timing is corrected at each unloading time.

"A final method under consideration is one wherein the rooms on the panel are driven in the same direction as the entry itself and are connected with the panel entry by 'key-cuts' (a line of breakthroughs between the rooms) which may be placed according to the judgment of the operator. Straight-line shuttle service may be utilized in these rooms, discharging onto a belt in the key-cut which conveys out to the main entry and loads into large cars. The key-cuts can be spaced, say, at 500-ft. centers which

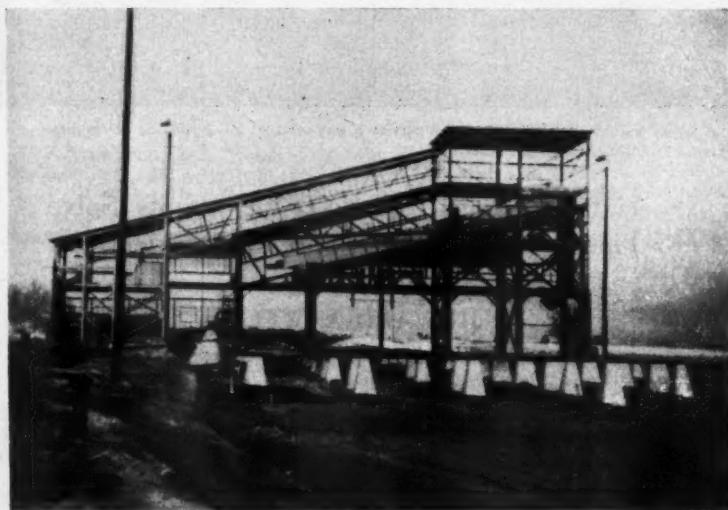
would mean that the straight-line shuttle service in the rooms would be about 500 ft., after which the belt conveyor would be moved up to the next location."

Preparation Plant

The head-end of the upper belt discharges onto a magnetic tramp iron collector which takes out any metal which might be in the coal. From the magnetic separator the coal discharges against breaker bars and falls onto the main shaker screen where its direction of flow is reversed. The breaker bars tend to break any pieces of coal which might be chilled and also tends to break the large lumps into furnace sizes, nut, etc. Reversing the flow of coal assures utilization of the full length of the screen as a belt discharging onto a screen in the same direction will impart such a velocity to the coal that some of it skids along the screen plates without going through the upper section of the holes.

The primary separation at the tippie is by shaking screens 10 ft. wide and from there the product will go to the sizing plant for screening, blending, crushing and such other preparation as may be needed. This sizing plant is being transferred entirely from another mine that has completed its working territory. For the present the tippie has five tracks but for postwar operation a nine-track yard with a washing plant is planned.

(Continued on page 65)



"In reviewing our various experiences, we decided to assemble the advantages of the various methods which we were now using, into a new layout. This new lay-out utilizes straight-line shuttle service from the face of the room to the panel entry where a mother belt conveyor, eliminating the necessity of track, transports the coal to large mine cars on the main entry which in turn carries the product to the hopper at the slope bottom.

"As the discharge of the shuttle cars is accomplished in about 35 seconds, it may be readily realized that the belt may be 'slug loaded,' that is a portion of the belt is loaded to capacity and the following portion runs empty. The belt trains properly when operated in this manner but its capacity is not utilized; to correct this situation, a plural number of machine units are located in a panel so that several shuttles use the same belt. The shuttle car discharging nearest

Construction views
Above: Preparation
plant

Right: 8-ft. belt
section and 10-ft.
hoist section of
slope



Transportation of Magnesium Ore



Complete truck-trailer unit is 70 ft. long, has a net weight of 45,000 lbs. and carries a pay-load of 30¼ tons on thirty tires

POSSIBILITIES of bringing more and more low grade mining properties under practical operation in the post-war era through the medium of low-cost motor truck transportation of crude ore and concentrates is reflected in the success which has accompanied the project of transporting calcined magnesium oxide and concentrates by truck from Basic Magnesium Incorporated's concentration plant at Gabbs, Nev., to its refining plant near Las Vegas, Nev., a distance of 334 miles, by Wells, Inc., of Reno.

Over a period of five months, commencing January 15, 1944, this trucking firm, through the medium of a fleet of specially designed tractor-trailers, has transported 13,500 tons a month for an astounding total of 4,509,000 ton-miles at a figure which will adequately serve as a yardstick in computing future handling costs of large tonnages.

Begun March 18, 1943, as a combined truck and rail haul, BMI for nine months transported its calcined raw material by truck some 34 miles to railhead at Luning, Nev., at which point the flour-like magnesium oxide, used in the manufacture of magnesium metal was reloaded into paper-lined box cars for an 1,100-mile haul by way of Utah, to the huge refining plant at Las Vegas. This operation necessitated the employment of 125 box cars between the two points. Traffic delays and the unavoidable loss through leakage of some two percent of each pay load, necessitated

Specially Designed Truck-Trailer Units Solve One of the War's Big Hauling Problems

By HOWARD A. WELLS

Vice President
Wells, Inc., Reno, Nev.

the instigation of direct truck delivery between the concentrator and the refinery, and with the receipt of additional large trucking units by Wells, Inc., the daily tonnage moved directly to the refinery by truck increased until, in mid-January of this year the entire output of calcined material and concentrates from the huge deposits in Gabbs Valley was being handled exclusively by motor transport.

Working through a contract with the Defense Plant Corporation at a stated figure governed by tonnage, the transportation company employed during the five-month period mentioned, 22 tractors and 44 trailers

in maintaining delivery of the capacity output of the Gabbs concentration plant.

The huge, specially designed, all-metal trucking units were manufactured at a cost of \$24,000 each. Within an inch of being 70 ft. in overall length, they have a net weight of 45,000 lb. and carry a pay load of 30¼ tons. Specially designed Diesel engines power the trucking units and the weight is distributed over 30

Trucks encountered all weather extremes, from snow and ice to blistering pavements



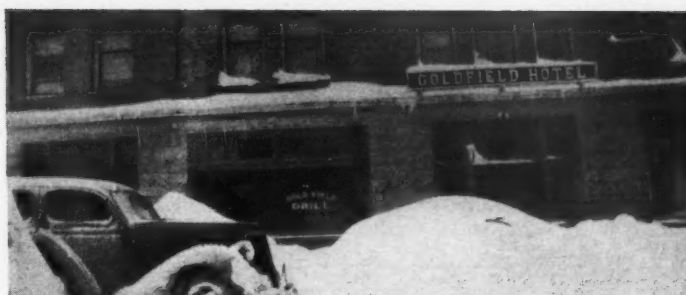
11.00-22 tires. A staff of 55 drivers handles the operation with a 25-man mechanic crew being assigned maintenance and repair work at the trucking company's principal shops in Las Vegas and a secondary shop at Luning.

Goldfield serves as a terminal point for the drivers. Taking a loaded vehicle from Gabbs to Goldfield, the driver meets a returning empty truck for which he exchanges his loaded carrier. In this manner, each driver completes a round trip to the terminal point within a single work shift and permanent residences are maintained at either end of the long haul. Twenty-four hours is required by each unit in making the overall round trip, including time required in servicing the vehicle.

A single tractor pulls two trailers which are equipped with small intake and discharge portholes, sealed to prevent the shipping of moisture or loss through wind drift or seepage.

The units are loaded from overhead storage silos at the calcining plant with huge suction apparatus being employed at the refinery in taking the exceedingly fine product from the carriers.

Fifteen loads daily, topping 30 tons to the load, was the five months average for Wells, Inc., over the January to May period, with delivery being continuous through temperatures varying from near zero to exceedingly



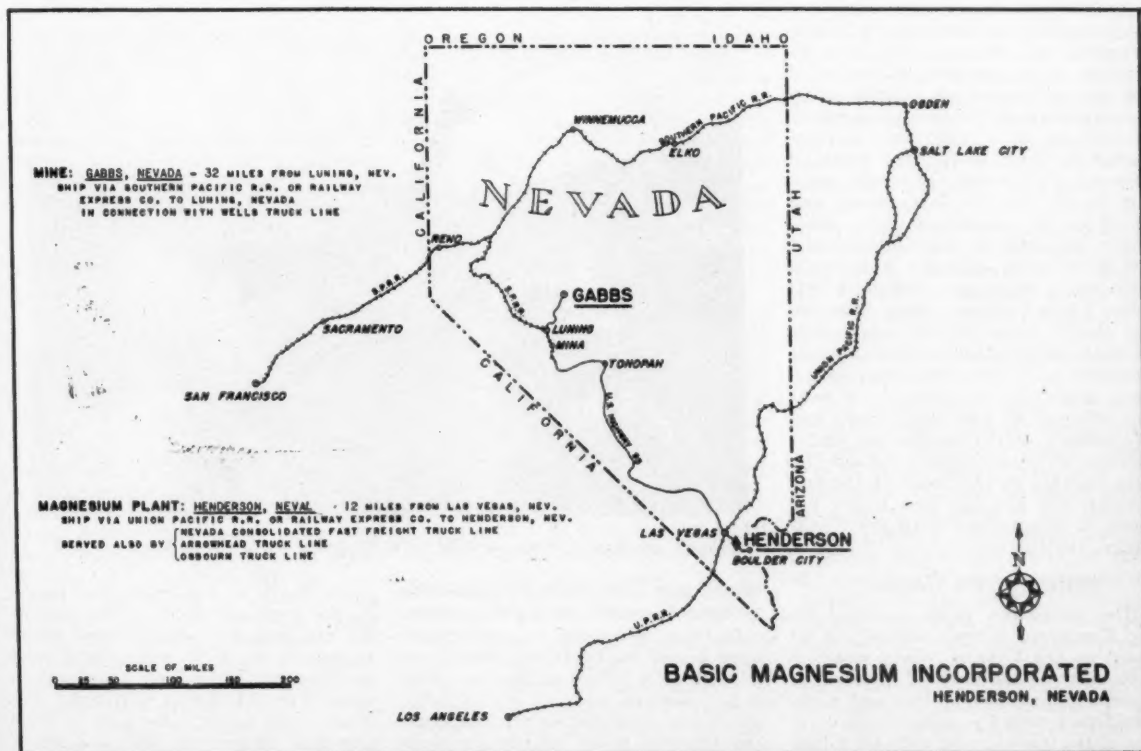
Goldfield is the turn-around point for the drivers. Each driver completes a round trip to this point in a single shift

hot weather. Moving over paved roads, the motor trucks encountered conditions graduating from snow and ice to the blistering hot pavements of Southern Nevada, affording a rigid test for tires and working parts alike.

That the transportation of raw materials by motor transport on a scale larger than any project previously undertaken in the western mining states has proved economically feasible is apparent from the fact that steps are now being taken to provide for continued operation in the production of magnesium metal at Las Vegas following the conclusion of war contracts. And with the development of non-metallics on a scale never before in the west in prospect for the post-war period, more and more mining

operators are studying with interest the results of this long-haul operation, in the belief that the key to the economic practicability of large-scale low-grade operations may lie in the adaptation of motor truck transportation as the ultimate low-cost link between the source of supply and refining or manufacturing plants.

"The trucking industry," says Joe Wells, president, "under the demands of a wartime economy has adopted mechanical improvements and revised handling methods to an extent where many marginal projects previously undeveloped because of implied financial risk can and will be reconsidered in the light of what large-scale, low-cost motor truck transportation can and is accomplishing."





Left to right: Sintering plant; screening tower; washing plant; car of ore entering track hopper

The Evergreen Mine

THE Cuyuna Iron Range lies about 50 miles southwest of Minnesota's great Mesaba Range and is also a very important contributor to America's iron and steel industry. On this range are located our largest reserves of manganiferous ore, and it produces the major part of such ores required by the nation's blast furnaces. A substantial tonnage of iron ore is mined also.

In 1859, strong magnetic variations were reported in this area in a government land survey; this was attributed to the presence of bog ore in the low marshy areas. Little attention was paid to the possible presence of iron ore until 1882, when a prospector put down several test pits. He also did considerable dip needle work, but finally lost his instrument, and as all his test pits struck water above ledge, his backers lost interest and the prospecting ceased. Very little exploration work was done until 1903 when Cuyler Adams, after extensive dip needle work, drilled a test hole through the overburden into low grade hematite ore. This discovery immediately attracted the attention of mining interests all over the country and exploratory work, mainly by churn drilling, proceeded rapidly. From the first syllable of the name of its discoverer and his dog Una comes the name of Minnesota's third great iron range, the Cuyuna.

History of the Company

The Evergreen Mine, operated by the Evergreen Mines Company, is located on the Cuyuna, about one-half mile north of the town of Crosby. A consistent producer of iron and manganiferous ores for many years, it is one of the three largest open pit mines of this range. It covers parts of five

Cuyuna Range Open Pit Produces a Variety of Iron Ores and Solves a Broad Combination of Problems in an Operation Using Both Rail and Truck Haulage

By HUGH J. LEACH

Superintendent
Evergreen Mines Company, Crosby, Minn.

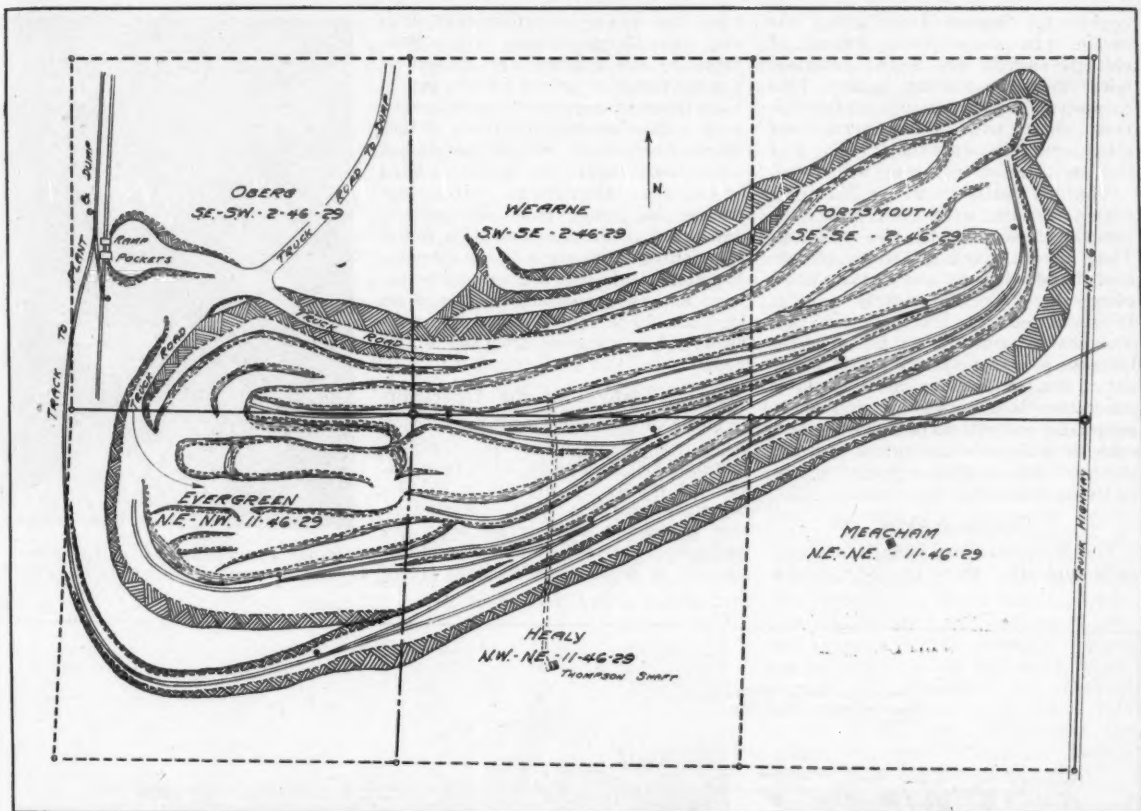


2 1/2-yd. shovel and 15-ton capacity trucks beginning a new cut on Evergreen "40"

forties and was originally opened up as three separate mining operations.

Drilling operations for exploration were begun in 1910 and carried on through 1924. First of the properties to be operated was the Healy forty, which was developed as the Thompson underground mine. It began shipments in 1912. In 1916, the Wearne

forty, north of the Healy was leased by the same operators. This part of the ore body was stripped and mined as an open pit, with some underground development carried on from extensions of the Thompson workings. The Portsmouth forty to the east of these two was stripped in 1918 and began shipments in 1920. It was not until



The general layout of the pit accommodates both truck and railroad haulage operations. Drainage handled through Thompson shaft

1924 that the Evergreen Mining Company was organized. In that year, leases were obtained on the Evergreen, Healy, and Oberg forties. The lease on the Healy forty had been surrendered by its former operators in 1919. A contract was let for the stripping of these properties and by 1925 the mine was shipping ore. This pit was named the Evergreen Mine. A sinter plant, the first of its kind designed to treat soft limonitic iron ore was erected and placed in operation the same year.

The Evergreen, Wearne, and Portsmouth pits were operated separately until 1928, when the Evergreen Mining Company began operating the Wearne pit for the Inland Steel Company, its lessee at that time, on a contract basis. In 1930, the Evergreen took over the Portsmouth pit from the Hanna Iron Ore Company on the same basis. The entire area was finally consolidated into one pit operated by the Evergreen Mining Company. This proved an excellent step forward. Not only were the mining conditions greatly improved, but "cross-grading" agreements allowed mixing of ores with consequent improvements in grades of ore produced, both as to quality and type.

This arrangement prevailed until

1932, when the Evergreen Mining Company was re-organized, and its successor, the present Evergreen Mines Company came into being. It took over the assets and operations of the original firm. In this same year the lease of the Wearne was given up and the property remained idle until 1935 when it was also leased by the Hanna Iron Ore Company and consolidated with its Portsmouth Mine. Since that time, there have been no changes.

The Evergreen Mines Company has come a long way since its beginning back in 1924. Its production has risen from the 1925 season's total of 23,893 tons to a total 1943 production of 3,211,000 tons, of which 1,301,000 tons were produced on the Cuyuna Range. It has risen to seventh place in tonnage produced by mining companies of the Lake Superior District. This season it is operating ten mines on the Cuyuna and Mesaba Ranges.

Geological Conditions Have an Important Effect on Mining Operations

The Cuyuna Range extends across Crow Wing County from Aitkin through Brainerd to Fort Ripley. It is about 65 miles long and ranges in width from one to 12 miles. The most important part of the range lies

within a four-mile section of this area north and west of Crosby enclosing the only mines producing at present. It is not surprising that this iron district escaped notice for a long time because there are no outcrops at the surface. Topographically, it is not a range, but is given this name from general usage in the district. The area is hilly and the ore bodies are overlain by a layer of glacial drift varying in thickness from 15 ft. to 400 ft., with an average of about 60 ft. This drift, consisting of sand with some clay and boulders, must be stripped off to uncover the ore before mining by open-cut methods.

The sedimentary rocks that comprise the area strike in general about northeast, and being closely folded, dip at high angles mainly to the southeast. The iron formation occurs in a series of eight to ten belts of varying length. Extensive geological mapping shows that most of these bands lie in the same horizon and are repeated by the folding. The ore-bearing formation lies between foot and hanging walls of schist or slate of various types. That the ore-carrying formation is not continuous across the range is due to erosion of the high parts of the folds. Variation in the pitch of the ore formation ac-

counts for barren areas along the strike. In some places, lenses of chloritic schist are found interlaid with the iron-bearing beds. This formation consists mainly of ferruginous chert with some ferruginous slate, and it is with these rocks that the ore is most commonly associated.

The ore bodies lie within the iron-bearing layers, with their long axes generally parallel to the bedding. They have a maximum width of several hundred feet and may extend along the strike for nearly a mile. Depth varies from 100 to over 600 ft. The ore is formed at the top of these belts as a superficial alteration product of the iron-bearing chert or slate. Alteration is generally attributed to magmatic emanations which rose and mingled with meteoric waters to leach out the silica, leaving a pocket of ore in the surrounding lean rock.

Evergreen Ores

The Evergreen ore body is geologically typical of those on the Cuyuna

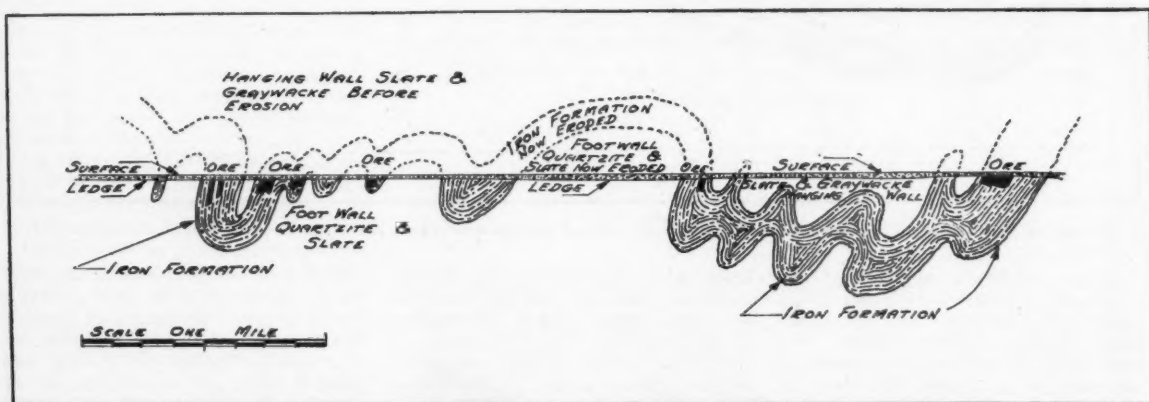
into two main classifications: Iron ore and Manganiferous ore. Both hematite and limonite are present in a wide range of colors. Wash ore of both types is commonly found associated with other higher grades of ore. Most of the ore in this pit is soft but some hard layers or localized hard areas are encountered. Iron ore ranges in grade from 62 percent downward, while manganese is found in amounts up to eight to ten percent. Practically all the ore is non-bessemer, with phosphorous sometimes as high as .400 percent. Moisture is generally high, ranging from 12 to 22 percent.

General Features of the Operation

The Evergreen Mine, in its present stage of development, is approximately 3,600 ft. long by 1,100 ft. wide. Present bottom of the pit is 185 ft. below the surface crest. Mining is now conducted entirely by open pit methods. Stripping of the surface, varying in depth from 40 to 75 ft., is



Standard railroad-car loading operations. Note the steeply inclined ore formation.



Geological cross-section of central portion of Cuyuna North Range—By Stephen Royce

Range. Strike is northeast and the ore body dips generally steeply to the southeast. Bedding of the ore is very pronounced. Layers of iron and manganiferous ores can often be definitely distinguished and are mined separately. Lean bands of ferruginous chert are found interbedded with the ore, as are also beds of schist and slaty material. The grade of ore varies widely, depending on the extent of alteration of the original rock. The individual layers of ore vary in width from two to three ft. up to around 100 ft. Some of these may be followed the length of the pit at depths up to 300 ft; others grade off into lean material at varying lengths and depths.

Cuyuna Range ore probably shows a greater variety of texture, composition, and color than the ore from any other iron mining district, and the Evergreen ore body is typical in this respect also. The ore may be grouped

now complete except for a small area in the southwest corner of the Evergreen forty. Previous to 1942, all the ore was mined by locomotive haulage, but in that year trucks were brought in to clean up the outlying ore areas on the north side of the pit, which, because of the nature of the deposits, were not readily accessible to railroad operations. In 1943, truck operations were expanded to include the Evergreen and Oberg forties so that at present, production is about evenly divided between the two methods. Locomotive haulage is still employed on the south side and bottom of the Portsmouth and Wearne forties and on the adjoining Healy. Each method proves very practical for the area in which it is used. The pit and plant are operated on a three-shift schedule, a six-day week, with pit and plant foremen in charge of production on each shift. With operations spread out over a large area, the pit foremen

have been provided with a pickup truck to get around the job in. This materially increases the general efficiency as a foreman can cover a lot more ground than he could on foot or by riding the trucks or locomotives.

Locomotive Haulage Utilized to Advantage

The ore body, throughout the south side and bottom of the pit, lends itself readily to locomotive operation. The seams of ore are relatively large and continuous, and as the pit and its trackage approximately parallel the strike of the ore, it is easily mined by this method. As the formation dips steeply to the south, cuts may be made separating the ore from the lean ore and waste. The split between the beds of material is generally very definite, although when ore grades off to lean ore in the same seam, it is not so readily apparent. From knowledge of the previous cuts

and bank samples taken ahead of the shovel, operators are able to inform themselves of the type of material being loaded. The ore and waste or lean ore sometimes occur in such a manner that they must be mined together. Mixed trains of ore and dump cars are then brought into the pit and the material is split in the cut. It is in areas of this type that a shovel operator's long experience in loading and judging ore really pays off, for he must be able to sort one from the other quickly and accurately.

Locomotive operations in the Evergreen pit conform generally to standard railroad mining methods. Two 80-ton standard gauge steam locomotives capable of hauling six to eight cars of ore or waste over two percent grades are used to service the shovel. Shovels used are a 2½-yd. Diesel-powered crawler type machine and a 2-yd. electric. Only one shovel is operated at a time on this operation. Mining is conducted on benches, varying in width up to 100 ft. Height of the banks ranges up to 50 ft. A 50-ft. bank is too high for a 2½-yd. shovel

of the railroads servicing the mine. Ore loaded in the pit may be shipped out direct to the docks or may be sent up to the plant for crushing, washing, or sintering, depending on its grade. Lean ore and waste material is loaded in 20-yd. side-dump cars for disposal on the dumps. This material is hauled about one mile from the pit, where it is disposed of on either lean ore or waste dumps. Two dumps are maintained for each type of material, which aids the operation in that one dump may be lined over and blocked preparatory to use while the other is being used. A dump plow is used for cutting down the dumps in preparation for lining. Because dump tracks do not have to be thrown far at one lining, a track shifter is used alone for this work. A two-man crew per shift handles dumping of the cars and track maintenance.

Because the Evergreen pit ore is mined for two companies, and because various types of plant ore are required daily, numerous shovel moves are necessary. In order to cut moving time to a minimum, a cradle car

considered practical to attempt to mine it, using locomotive haulage. Because it was desired to recover this ore and other outlying pockets of ore along the north bank of the pit, a truck haulage system was laid out. The stripping was contracted out, and a road constructed along the north side of the pit to the area. A ramp and a dump-pocket were built for loading the trucked ore into cars. Fifteen-ton capacity end-dump diesel trucks were brought into the pit and a 2½-yd. shovel was provided for loading. In 1943, because of the nature of the deposit and the operating problems involved in rail haul, it was decided that truck operations should be extended to the Evergreen and Oberg forties. An approach was cut into the west end of the pit, along the footwall, and provision was made for moving the shovel by locomotive and cradle car in order to save moving time, so that the operation could quickly be switched from one end of the pit to the other.

Main haulage grade into the east end of the pit is eight percent, while that into the west end, because of limited space, is ten percent. Road grades in the pit are kept under eight percent where possible, but when it becomes necessary to go above this figure, it has been found that the loaded trucks will successfully climb grades of as high as 22 percent.

Trucks Make More Ore Available and Reduce Waste Handling

The truck operation in the Evergreen pit has proved to be highly successful. Under this plan of operation much ore has been and will be removed from the north side of the pit which it would have been impractical or impossible to remove with locomotives. By mining the ore with trucks, the amount of lean ore and waste removal has been cut to a minimum with consequent saving. The Evergreen forty has shown a much greater production this year than would ever have been possible with rail haul methods, because with the ore lying in narrow seams as it does, a great amount of waste removal would have been required to get locomotives in on proper grades. With trucks, it has been possible to mine the ore only, leaving the waste material on either side of the cuts to be taken out when conditions permit.

Ore loaded into trucks is hauled out of the pit to a ramp where it is dumped into cars. Two ramps are available. One is equipped with a 12x18-in. grizzly and a feeder for loading ore to be shipped direct. The grizzly is necessary to limit the size of chunk that can be loaded and, by use of a feeder, full loads are obtained on all cars with minimum spillage. Oversize is broken by means of mauls or air hammers. The other



Cradle car has proven a most convenient means for rapid transfer of shovels about the pit

with a maximum reach of 35 ft., but by blasting down these high banks overhangs are prevented and operations are conducted in complete safety to men and equipment.

Main haulage tracks are laid out on a maximum grade of two percent. Track maintenance in the pit and on the dumps is conducted by the usual track crew. Tracks are thrown in the pit by a track shifter with the aid of a bulldozer, which also does the finishing work on the track subgrades. By use of the shifter and dozer in this manner, much less hand work is required, and a considerable saving in time and labor is effected.

Pit Loading Problems are Varied

Ore is loaded into 50-ton steel bottom-dump cars which are the property

is used whenever possible. It is a low-slung car. To board it, the shovel has only to throw up a low ramp of dirt alongside the track, and walk on. This does very well for shovels of the size used, and by this means a shovel can be moved from one end of the pit to the other in less than an hour.

Trucks Enter the Picture

The Evergreen Mines Company has operated trucks at other Cuyuna Range mines since 1937, but not until 1942 were trucks used to haul ore in the Evergreen pit. Prior to that time a small high grade body of ore, an offshoot of the main Portsmouth ore body, was known to exist in the northeast corner of the pit. Due to its location and the amount of waste material in the area, it had not been

ramp is merely an open chute for loading "wash," "crush" or "sinter" ore. This ore is hauled to the main plant where it is crushed and processed, and in this case, it is unnecessary to limit the size of the chunks or to fill the cars to capacity.

Roads are a Constant Problem

Waste and lean ore are hauled to separate dumps for disposal. Much of this material was used for surfacing the main haul roads, which when cut through the sand surface material do not hold up well under the heavy loads they are subjected to.

Roads on ore present a considerable problem at times. In some regions of the pit, the ore is high in alumina and because of its clayey nature, roads on it become soft and slippery in wet weather. Even when the roads are well drained this condition exists. It is interesting to note that hauling conditions are better during a heavy rain, when the mud is washed off the road as fast as it is formed, than during light soaking rains, or during the period after a rain, when the roads get very muddy. During wet weather, it is often necessary to stop mining in these areas and move to a cut where, because of the structure of the ore, the roads will stand up in spite of moisture. Where roads are on ore, it is not feasible to surface them with lean material except when absolutely necessary, because this would have to be removed before the ore beneath could be dug out. When properly surfaced, the main haul roads never cut down appreciably, and can be driven over under any weather conditions.

The other extreme is reached during dry periods. The roads then get so dusty that constant service of a sprinkling truck is required. The truck used for this purpose hauls 700 gal. of water per trip, and in addition to wetting down the roads, brings

drilling water to the drills whenever they are accessible by truck.

Road maintenance machinery consists of a power patrol and tractor. In addition to caring for the roads, both machines are used to clean up spill at the shovel and push dirt on the dumps. The road patrol is equipped with a bulldozer blade, and can be used for pushing dirt if the job is not too tough.

Prior to 1943, main haul roads on Evergreen's truck operations were treated with asphalt and oil. This had the effect of making roads practically dust-proof and gave a hard, smooth surface that required no maintenance. These roads were first surfaced with jig tailings which, mixed with sand, formed an excellent base for oil treatment. This practice has been discontinued because road oil is no longer available. Jig tailings are still used alone for road surfacing, and except for the tendency to get dusty, make a very good top cover.

Lean Ore and Waste Requires Most of the Drilling and Blasting Effort

Ore throughout the pit requires but little blasting except where banks are too high for safe shovel operation or localized hard spots are encountered. Much of the lean ore and waste, however, is hard and requires breaking. Two methods of drilling are used. Standard churn drills using six-inch bits are used for blasting down high banks or in hard ground where the top of the bench is accessible. Holes are spaced 15 ft. apart and are generally drilled five ft. below the toe of the cut in order to insure a thorough break at the bottom of the bench. They are loaded with 5x16-in. powder and are detonated either by electricity or with primacord, depending upon conditions.

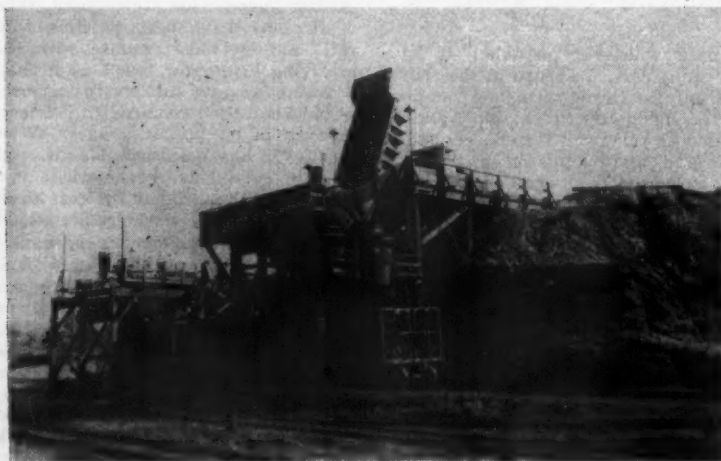
Where it is impossible to get on top of the bank with a churn drill, a wagon drill mounting a 4-in. drifter

is used for drilling. Two 300 cu. ft. compressors are available; one Diesel driven, mounted on rubber tires for areas where it can be towed about by truck or tractor and the other, electrically powered, mounted on a home-made heavy push-car for areas of the pit where it can be run about on rails. Power for this machine is obtained from the 2,200-volt shovel feed lines in the pit. Horizontal and toe holes, spaced about 20 ft. apart in groups of two to four are drilled up to 24 ft. in depth, depending on the height of the bank and the amount of break desired. All air drilling is done wet, using a water tank with pressure furnished by the compressed air. Dry drilling is almost impossible in the average ground encountered, particularly if deep holes are required because the rubbly cuttings cannot be blown out of the hole and the drill rods stick and plug. Because of poor ground conditions few holes are drilled vertically with this machine. If a churn drill can be used instead it will do a faster, cheaper job. Holes are started with a 3½-in. bit, and are loaded with 2x12-in. powder. This is a large size bit compared with the diameter of the powder cartridge, but because the holes are so ragged, it has been found that this combination is most satisfactory. Holes are sprung if necessary, and are shot electrically.

Pit Drainage is by Shaft

Drainage of the pit is effected through a drift under the pit from the old Thompson shaft. This shaft being of concrete construction to ledge required only a little timber repairing to put it in good condition for use as a pump shaft. The bottom level of the mine is at 250 ft. and the old main haulage drift came almost to the Wearne south line. As the pit was deepened, and water was encountered, it was found that practically all the water was coming in from the footwall side. A 4x8-ft. cribbed shaft was sunk in the Healy forty to the end of the old drift and a small drift was driven about 200 ft. north to the footwall. A raise was driven up into the pit at this point, and the water brought into the raise by deep ditches which were dug with a dragline in the ore along the footwall. Deepwell pumps in the shaft pump out the water which is then used in the wash and sinter plants. Excess is diverted to a drainage ditch. This system has served very effectively to control the pit water. At present, because the bottom of the pit is not being mined, no attempt is being made to keep it dry, and only enough water is being pumped to supply the needs of the plants. This is sufficient to maintain the water level below the working elevations.

It will be possible to lower the pit bottom about 25 ft. with the present



Foreground: Direct ore truck ramp. Plant ore goes over ramp to the left

method of drainage. Below that depth, further development of drainage facilities will be required. Several possibilities are being considered such as wells, a drainage shaft in the pit, or a drift from the 350-ft. level of the old Meacham shaft on the south side of the pit.

One-Third of the Ore is Sintered

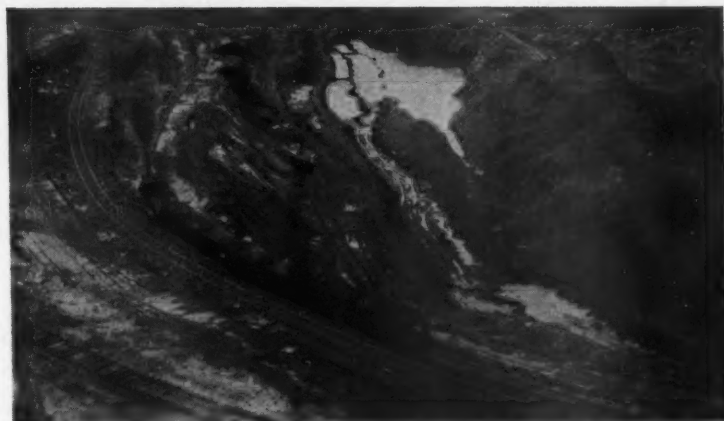
Ore from the pit can be loaded into cars for direct shipment, or sent to the plant for beneficiation. In 1924, when the original Evergreen Mining Company was organized, it was decided that a sinter plant was necessary to treat the high moisture ore from the original Evergreen pit. This was constructed and placed in operation in 1925. Little was known about sintering iron ore and the operators had to learn the hard way, by experience.

The first sinter machine was of the Dwight-Lloyd type, 36 in. wide by 65 ft. long, and its best production was about 400 tons of sintered product per day. As no secondary crusher was included in the circuit only the crude fines— $\frac{1}{2}$ -in. could be sintered. The screened lump was shipped direct. This machine has been remodeled twice and now is 72 in. wide by 126 ft. long. Average production of the present machine is 1,150 tons per 24 hours. This is the largest sintering machine in this country and the plant is the only one of its kind treating hematite ore in the Lake Superior District.

In 1931, experiments proved that much of the leaner ore material could be improved in grade by washing. Consequently, a washing plant was erected near the sinter plant, using a screen log washer and classifier to handle this material. In the present mill, ore can be crushed for direct shipment, crushed to $\frac{1}{2}$ -in. for feed to the wash plant, or crushed to $\frac{1}{4}$ -in. and sintered. If desired, the ore can be screened, the oversize $\frac{1}{2}$ -in. shipped direct and the undersize washed or sintered. This flexibility makes possible the beneficiation of widely varying types of ore.

The Plant Flowsheet in Brief:

Crude ore in 50-ton bottom-dump railroad cars is dumped in the track-hopper, over a chain grizzly. Oversize is crushed through a 36x48-in. jaw crusher and joins the undersize on a belt to the screening tower, where it may either be by-passed direct into cars or prepared for the plants. Plant ore is run over screens in closed circuit with a hammer mill, reducing the ore to proper size for either the sinter or wash plant. Surge bins are provided to store ore of either type. If the ore is to be sintered, it is drawn from the bins on a belt on which is also fed the sintering fuel. Anthracite (anthracite screenings) is used



The locomotives haul six to eight standard railroad ore cars per trip over 2 percent grades

at present. Because of the high moisture content of the ore, averaging 27 percent free and combined water, about 12 percent of fuel per ton of sinter produced is required. Coal and ore are thoroughly mixed in a pug mill and fed to the sinter machine to form a bed 14 to 17 in. deep. The mixture is ignited in a furnace burning powdered coal, and sintered. Sinter is dropped direct into ore cars which are sprayed until the sinter cools.

Wash ore is drawn from a stock bin onto a belt which feeds the ore onto a vibrating screen equipped with high-pressure sprays. The screen undersize, $\frac{1}{2}$ -in., goes into the log washer and the overflow from the log is fed to a straight rake classifier. The screen oversize, log and classifier product, are mixed to form the concentrate and the classifier overflow is piped to the tailing pond. Production of the wash plant is 2,000 to 2,500 tons daily.

All Cuyuna Range ore is handled by a joint Northern Pacific-Soo Line Railroad operation to Superior, Wis., for shipment by boat down the Great Lakes.

The following table gives the 1943 shipments from the Evergreen pit that were beneficiated in different ways:

	Tons	Percent of Shipments
Direct Ore	167,700	28.4
Crushed Ore . . .	62,100	10.5
Screened Ore . .	23,400	4.0
Washed Ore . . .	132,100	22.4
Sintered Ore . . .	204,200	34.7
Total Shipments	589,500	100.0

Repairs and Personnel

The Evergreen operates its own shops for the maintenance and repair of its equipment. At the Evergreen plant site are located the locomotive, shovel, electrical and general repair shops, consisting of a blacksmith

shop, two welding shops and a machine shop. A shovel shop is provided, large enough to move a shovel inside. This is particularly useful in winter repair work, because men can work inside in comfort, and thereby accomplish much more. Overhead trolley hoists are provided in each shop for handling heavy equipment parts.

Truck repair is handled at the Huntington garage, located about two miles west of the Evergreen pit. Here is located the headquarters for the "West Group" of the Evergreen's Cuyuna Range mines, with a complete truck and tractor repair shop and warehouse. In addition to repair work on these units, all work on other automotive equipment is handled here.

The pit operation requires a crew of about 105 men per day while the plant crew and shops require about 130 men. Winter operations, consisting of stripping and repair of plants and equipment, necessitates a considerable cut in the number of men employed to about 140.



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in mechanized mining operations often can be of tremendous help in solving difficult production problems. Our case records contain many such instances where red ink has been changed to black on the books and frowns of production worry have disappeared in smiles of satisfaction when the month's totals were charted upward.

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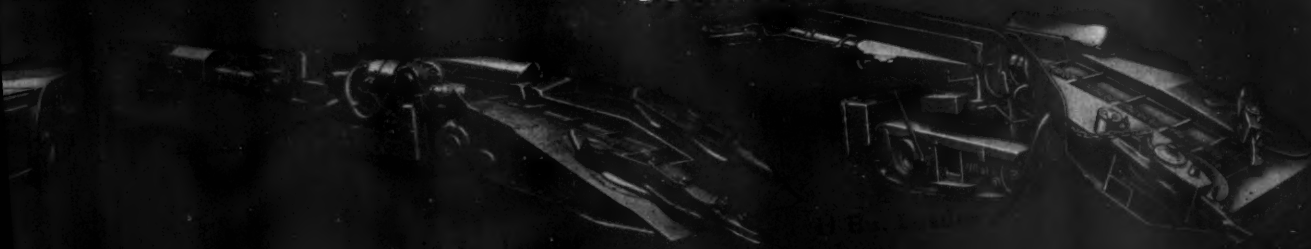
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LOADERS





New washing plant of Pardee and Curtin Lumber Co.

Clay Vein Problems Reduced By Mechanical Loading and Cleaning

A COMPARATIVELY new technique in mechanical coal mining is being developed for seams that contain impurities of such nature or quantity that underground separation is difficult and costly as compared to mechanical surface cleaning. This method is to load the entire seam (coal and partings) with a loading machine and to make the separation by mechanical cleaning at a surface plant. While this practice has to some degree been followed ever since the development of mechanical cleaning, it has largely been applied to seams with small bands of impurities that could not be picked out at the working face; in fact, mechanical cleaning was originally developed for such cases, but the usual plan was to try to reduce the amount of surface slate removal by some underground separation. During the past few years, however, mechanical cleaning processes have been improved and their performance efficiencies have been raised so that, under certain conditions, it is now proving more economi-

A coal mine that had been forced to close down when using hand methods is now being operated successfully

By PAUL ALLEN HORNER

Consulting Mining Engineer
Clarksburg, W. Va.

cal to increase the cleaning plant burden rather than to lighten it by extra operations at the working face. A number of companies have already adopted this procedure for handling various classes of impurities and some interesting developments have been made. Among these is a mine in eastern Ohio that loads from 8 to 12 in. of drawslate with the coal and cleans the product mechanically on the surface.

Slate and Coal Loaded Together

A situation where full seam loading is especially adaptable—in fact appears to be the only method for successful mining—exists at a property

in northern West Virginia where clay veins are present to an unusual degree. This is an operation recently installed by Pardee & Curtin Lumber Company near Lost Creek, working the Redstone seam which has a height of about 6 ft. of coal with no serious partings. The clay veins, however, are decidedly troublesome, so much so that a hand-loading mine started several years ago in the property was found to be uneconomical and subsequently closed down.

Clay veins, which are vertical or inclined intrusions of clay into the coal, are of course rather common in certain seams and certain districts.

Right: Much coal was wasted on the slate dump before the cleaning plant was installed

Below: Refuse from cleaning plant has no waste coal



be, but the present results are definitely encouraging.

Mining Plan

The seam in general has a height of about 6 ft., easy grades, fairly good top and, with exception of the clay veins, no serious natural difficulties. The mining plan is the so-called "block system" where narrow places are driven on 80 ft. centers, developing a panel into solid blocks of coal about 70 ft. square, which are subsequently recovered by open end or cross cuts. The underground work so far, as shown on the map, has consisted of entry development driving a series of eight headings.

The mine is operated with Joy 7 B.U. loaders and 4-ton shuttles, which transport to the panel haulageway, laid with 40-lb. steel rail, and discharge into an elevating conveyor that loads a trip of mine cars. These were furnished by American Car & Foundry Company and are the drop bottom type, 6½ ton capacity, steel construction with Timken roller bearings, and are equipped with a spring bumper at one end. The coal is cut with a Jeffrey shortwall cutter mounted on a Joy tractor, drilled with a Jeffrey electric drill and shot with permissible explosive. The shuttles have Exide storage batteries but all other face machines are operated with trailing cables. The cars are handled in 8 car trips by 10-ton locomotives from the underground loading point through the tippie where they dump through the drop-bottom doors without uncoupling.

Tippie and Dump

The seam outcrops about 100 ft. above railroad grade and the mine is opened by a drift with an outside

Where their occurrence is not too frequent and affect only a small percentage of each day's working places, they can be handled at a reasonable cost by underground separation and some wastage of coal. However, as shown on the accompanying map, so many clay veins are encountered in this mine that the usual method of removal was not practical—there was too much lost time in trying to separate the slate and there was too much lost coal.

About a year ago the property was acquired by Pardee & Curtin, under the direction of George D. Curtin, president, with the idea of adopting complete slate handling by mechanical loading and mechanical cleaning. This plan was put into effect and the entire seam is now loaded as it occurs underground. Separation is done mechanically at the tippie—the only exception occurring when the clay vein has such thickness that cars of slate can be loaded and dumped as refuse

without passing through the cleaning process.

After several months of trial the operation has reached the point where it seems to offer a promise of success. Certainly, the mechanical loading has been speeded up and the machine output has been increased by eliminating delays that would otherwise occur if underground separation were attempted; and equally important, the loss of coal has been reduced to a negligible quantity. No data on quantities is yet available but the photographs in Figures 1 and 2 tell an interesting story. Figure 1 is the old slate dump that existed prior to the installation of the cleaning plant and the large quantity of coal wasted is very apparent; figure 2 shows the reject from the new cleaning plant and here it will be noted that the refuse does not contain any appreciable coal loss. It may still be too early to predict what the final answer will

tramroad 1,000 ft. long to the tippie. The tippie is built along the side of the hill, and on account of the difficulty of obtaining steel, is constructed of wood with corrugated iron roofing and siding. It has two bins; one for coal, with a capacity of 200 tons, and another of the same size for slate. As already mentioned, cars of slate are loaded where the clay vein is of sufficient thickness to do this and the refuse bin becomes full about every two days. This is loaded into a truck and hauled to a dump on the hillside nearby. Near the mine portal are the usual surface buildings: lamp house, shops, supply house, etc., all of which are constructed of concrete blocks.

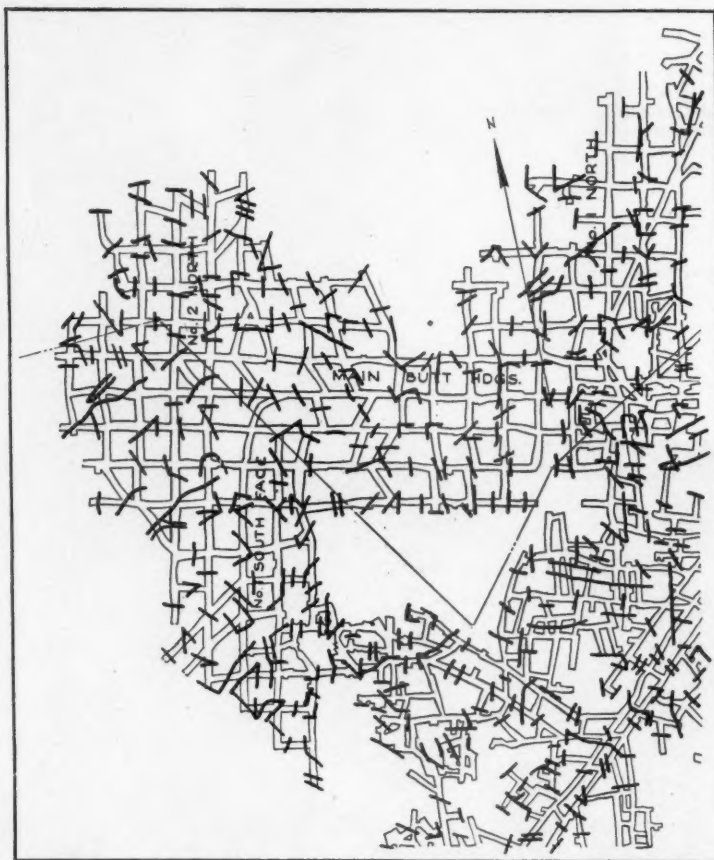
The cleaning plant is located on the railroad across the valley from the tippie. At the bottom of the tippie bin, the coal is fed by a reciprocating plate onto a 36 in. belt about 100 ft. long, which leads to a smaller bin on the hillside. From here a 600-ft. Leschen aerial tram takes the coal across to the cleaning plant. This tram has $4\frac{1}{2}$ -ton buckets which dump automatically into a 25-ton bin at the preparation plant. The belt conveyor and the aerial tram are used equipment which has been taken from other mines that have been worked out and abandoned.

Cleaning Plant

The preparation plant is also of wood construction with some new and some used cleaning and sizing equipment. It was designed and built by Interstate Engineers and Constructors, Inc., of Fairmont, W. Va. The slate cleaning is done with Belknap Washer units employing a solution of calcium chloride as the separation agent.

A conveyor, loaded by means of a reciprocating feeder, takes the coal from the dump bin at the aerial tram discharge to the top of the cleaning plant. Here it goes onto a cross flight conveyor, which in turn discharges onto 3-in. bar screens. Some hand picking is done at this point and the plus 3 in. product goes into a roll crusher. The crushed coal is then mixed with the minus 3 in. and the entire product is passed over vibrating screens. These make two sizes—a plus and a minus 1 in.—which are washed separately. There are two Belknap wash boxes, from which the cleaned coal passes over elevating dewatering conveyors. These elevators discharge to a set of shaking screens which make the final sizing for loading into railroad cars.

The rejects from the picking table and the wash boxes are handled through the plant by a conveyor that discharges onto the ground at the end of the structure across the railroad yard. The refuse is now being spread



Mine map showing occurrence of clay veins in the main entry development

by a bulldozer to fill in some low ground at this point. Eventually it will be taken to a slate dump on the hillside.

The Pittsburgh Seam in this area lies about 40 ft. under the Redstone, and a strip mine has recently gone into operation on the side of the hill above the tippie. The strip coal is

brought down to the tippie by trucks and loaded into the same bin which receives the Redstone coal from the aerial tram. Here both are mixed together and pass into the cleaning plant. These two coals are rather similar in quality and are blended to form a very satisfactory steam and domestic product.

Keep the Children Safe

SCORES of children are blinded, maimed, or killed each year in the United States as a result of playing with blasting caps carelessly stored by their negligent elders, Dr. R. R. Sayers, director of the Bureau of Mines, said recently in announcing publication of a Bureau report on such accidents.

Thirty-three children were injured, nine losing the sight of one eye and 13 forfeiting one or more fingers or other parts of their hands, in 18 typical accidents outlined in the report.

Simple rules are sketched for reducing accidents by keeping blasting caps from children, who seldom are aware

that the devices are extremely sensitive and explode violently with a shower of metal fragments. The rules apply to the users of explosives, who should store caps safely; to parents, who should warn their children of the dangers of playing with explosives and discipline them against stealing; and to schools, which could teach children to recognize blasting caps and to leave them alone.

A copy of the report may be obtained by writing to the Bureau of Mines, Department of the Interior, Washington 25, D. C., for Information Circular 7275, "Accidents to Children from Blasting Caps," by D. Harrington and R. G. Warncke.



PLAN YOUR PLANT DRIVE NOW!

Good organization will be needed to sell the 6th. The task of raising the huge sum required will be the most difficult ever asked of Industry. As each new military success brings us closer to Victory, the public naturally will feel that the urgency of war financing is lessened—whereas it isn't. So organize now to prevent a letdown on the home-front from causing a letdown on the fighting front. Build your plant's payroll campaign around this fighting 8-Point Plan. You don't have to wait for the official Drive to start—swing into action NOW!

- 1 BOND COMMITTEE**—Appoint a 6th War Loan Bond Committee from labor, management and each representative group of the firm.
 - (b) *Pre-drive letter to employees from management and labor.*
 - (c) *Competitive progress boards.*
 - (d) *Meeting schedules, etc.*
- 2 TEAM CAPTAINS**—Select a team captain, for each 10 workers, from men and women on the payroll—but not in a supervisory capacity. Returned veterans make most effective captains.
- 3 QUOTA**—Set a quota for each department and each employee.
- 4 MEETING OF CAPTAINS**—Give a powerful presentation of the importance of the work assigned to them. Instruct them in sales procedure. Have them carefully study the Treasury Booklet, *Getting the Order*.
- 5 ASSIGNMENTS**—Assign responsibilities for:
 - (a) *Music, speeches and announcements of the opening rally.*
- 6 CARD FOR EACH WORKER**—Dignify each personal approach with a pledge, order, or authorization card made out in the name of each worker. Provide for a cash purchase or installment pledge. Instruct each captain to put a pencil notation on the card to indicate the subscription he expects to solicit from each worker.
- 7 RESOLICITATION**—People don't mind being asked to buy more than once. Resolicit each employee toward the end of the drive in a fast mop-up campaign. Call upon your State Payroll Chairman; he's ready with a fully detailed plan—NOW!
- 8 ADVERTISE THE DRIVE**—Use all possible space in the regular media you employ to tell the War Bond story.

The Treasury Department acknowledges with appreciation the publication of this message by

MINING CONGRESS JOURNAL

This is an official U. S. Treasury advertisement prepared under the auspices of Treasury Department and War Advertising Council

Marketing Agencies For Producers Of Natural Resource Products

For over a half a century industry has been trying to determine the line of demarcation between that which is lawful and that which is unlawful in the operations of loosely-knit associations designed to improve the standards of competitive relations and to bring about a more equal bargaining opportunity between buyers and sellers. That these associations have definite and distinct services to perform in our modern industrial society will surely be conceded by all. During this period we have learned that in our economy the conservation of natural resources, the elimination of wasteful practices, the promotion of efficiency in production and distribution, the standardization of identity and quality, the arbitration of commercial disputes and the regulation of unfair and deceptive practices are economic necessities. These lessons have been brought home to us and are today indelibly stamped on our minds by the exigencies of the present worldwide conflict.

DURING the past 50 years we have learned that it is not easy to determine that which is consistent and that which is not consistent with the maintenance of competition. We have seen decisions rendered by our courts which cannot be reconciled either by factual analysis or by legal distinction. We have seen industry stagnated by court decisions and left to "voyage upon the chartless sea of doubt." And, finally, we have learned that integrating the rule of reason into our anti-trust acts is not enough. It has not dispensed with, although it has mitigated somewhat, the element of judicial discretion.

Our present problem is not the development of a device but the development of a recognized method of controlling a device which will preserve for the public the protection and advantages of free competition and at the same time afford industry an opportunity to reach toward those goals which I previously mentioned as economic necessities. If this can be done a forward step will have been taken both in economics and in law. I want therefore, to invite your attention to a consideration of marketing agencies for producers of natural resource products as a device capable of use, and, in particular, to the choice of a method of control to be employed by government in dealing with such agencies under the anti-trust laws. In this paper no attempt will be made

to consider the various problems involved in the judicial control of the enforcement of the anti-trust laws with respect to monopolies by fusion.

Before launching into a consideration of marketing agencies as such, it is necessary to review somewhat the growth of our case law with respect to loosely-formed associations under the anti-trust acts. Time does not permit more than the briefest kind of an outline at this time. It is given solely for the purpose of quickening your suggestions and criticisms of that which I shall have to say about the development of the marketing agency.

Trends in the Law on Restraint of Trade

Much has been written on the status of the law having to do with restraints of trade prior to the passage of the Sherman Act in 1890. More has been written on the status of the law with respect to restraints of trade since Chief Justice White imported the so-called rule of reason into the Sherman Act in his decision in *Standard Oil Co. of New Jersey v. United States*, 221 U. S. 1. It will be sufficient for our purposes if it is borne in mind that prior to 1890 three separate and distinct trends in the law on restraint of trade took place. First, there was the trend toward the view that all agreements between persons in the same industry or trade which resulted in or had for their purpose the elimination or reduction of competition through (a) the fixation of prices,



By HOWARD W. VESEY

Attorney
Washington, D. C.

(b) the control of production, (c) the allocation or division of markets or customers, or (d) the pooling of profits, were unlawful regardless of whether or not (a) the prices thus fixed or to be fixed were reasonable, (b) the agreement was made in aid of competition through the stifling of ruinous competition, or (c) the agreement in its entirety was actuated by the highest of motives.

The second trend was toward the view that agreements among minority interests were lawful even though competition among the parties thereto was eliminated or effectively controlled, provided market control was not obtained and free competition in the market was unaffected thereby.

The third trend found expression in the view that the legality thus extended to minority interests should be

*From an address before Mineral Law Section, American Bar Association, Chicago, September 12, 1944.

extended to persons having monopoly power, provided they did not in their agreements abuse the monopoly power which they possessed. Under this latter view price-fixing agreements were not illegal *per se*, but might be upheld under certain circumstances.

These trends were under full sway in this country by 1890. They were an outgrowth of what was thought to be a proper application of the "rule of reason" as applied at common law.

With the passage of the Sherman Act a further complication was added. The statute was completely silent as to the meaning of its most important term, "restraint of trade." It simply stated that

"every contract combination or conspiracy in the form of a trust or otherwise in restraint of trade or commerce among the several states"

was unlawful. As all of you know, our Supreme Court, in interpreting the Sherman Act, at first rejected any application of the so-called rule of reason and gave primacy to the word "every." In these decisions the court determined that Congress was attempting to codify the common law. Justice Peckham, in the *Trans-Missouri Freight Association* case (166 U. S. 290), in giving full effect to the word "every," gave the statute the narrowest of interpretations. Chief Justice Taft, in the *Addyston Pipe* case (175 U. S. 211), while agreeing with the theory of common law codification, apparently became so engrossed in ascertaining the legal status of restraints at common law that he failed in his decision to give any effect to the word "every" and rejected the so-called rule of reason because his study of common law restraints led him to the conclusion that only ancillary restraints were lawful and then only in certain situations.

"Rule of Reason" Enters the Picture

Thus, it was not until 1910 that the Court gave effect to the interpretative policy which has formed the pattern, with few exceptions, of its decisions in restraint of trade cases—the so-called rule of reason and the development of a thin, and, at times, wavering line of demarcation between cooperative associations of producers and loosely-knit trade associations. Although the rule of reason was imported into our law by ascribing an artificial meaning to the term, it is today a well settled and adhered to fixture. It is to be regretted that we cannot say as much for the line of demarcation between producers' associations and other types of trade associations.

Today, we see in retrospect the disillusionment of industry occasioned by the erroneous conclusions drawn from Chief Justice White's dictum in the *Standard Oil Co. of New Jersey v.*

United States case. The error was the belief that the Court might uphold any scheme or device for curtailing or controlling competition if it could be justified on grounds of business expediency or the balancing of public interest. A close study of the Court's decisions will show that while it has not been always consistent, and while the Act and the rule have meant different things to different justices, the Court has followed a fairly consistent pattern throughout its many oscillations.

This pattern has as its axis the theory that free competition in its fullest sense is the central nervous system of our economy, and that the public is entitled, under the anti-trust laws, to the full protection and to all the advantages which flow from it. Hence, any device or scheme which diminishes this protection or which reduces these advantages is unlawful and contrary to the statutory purpose.

The most important single conclusion that can be drawn from this pattern of judicial decisions and which at all times should be kept in mind in appraising the legal status of any combination under the anti-trust laws is that our courts today do not follow strict economic theories in determin-

ing what is a monopoly or a restraint of trade. Monopolies and monopolistic practices in law are not the antithesis of pure competition or free competitive practices. To the economist the primary consideration is the degree of market control effected and its consequent effect on prices and competition.

The legal test, on the other hand, is whether or not the freedom of the individual to compete has been suppressed or is being impeded by an agreement among competitors or through the predatory tactics of rival competitors. The degree of market control effected is thus, under our legal test, of importance only insofar as it serves as an aid in determining whether or not there is any suppression of the freedom to compete. It should be observed that it is therefore immaterial to inquire into the reasonableness of price agreements, the motives for the suppression of competition, or the public good emanating from the scheme compared to the public good flowing from free competition. These obviously are considerations of public policy and business expediency rather than elements to be considered in determining the statutory purpose.



The United States Supreme Court

Courts Have Almost Invariably Neglected Evidence Relating to Market Control

If our courts had followed the economic definition of monopoly these factors would have assumed the role of primary considerations. They are all factors of primary importance in determining the extent of market control. Although our courts in virtually every case comment upon the evidence relating to market control, this evidence is almost invariably neglected by them in reaching their decision. The reason why this is so is quite obvious—courts are simply not equipped to evaluate these factors. Any attempt on their part to do so would lead to legal chaos. Nevertheless, lawyers in almost every anti-trust case since the decision in *Standard Oil Co. of New Jersey v. United States* have attempted to highlight these economic factors. Regardless of their many and varied attempts to do so, we should know by this time that in the absence of statutory authority the following activities are clearly illegal and in violation of our federal anti-trust laws:

1. Price-fixing by agreement or understanding;
2. The allocation of customers either by agreement or understanding;
3. The allocation of markets either by agreement or understanding;
4. The control or curtailment of production regardless of the degree of market control effected;
5. The pooling of profits.

On the other hand, we know today that agreements which are designed

to improve competitive methods and to facilitate competition rather than the regulation of market competition will be held to meet the legal tests even though, from an economic point of view, they may grade toward monopolies or monopolistic practices. In judging such agreements, purpose and intent are important factors; likewise, the status of the industry involved, the abuses sought to be corrected, the publicity given to the data used and employed by the participants, and the absence of coercive influences. The presence of these factors causes the agreement to harmonize with the legal conception in that they tend to facilitate competition rather than restrict the freedom to compete. Plans of operation based upon these factors and our legal conception of restraint of trade may involve some degree of market control. In the six cases involving agreements between competitors which have been upheld by our Supreme Court, some degree of market control was involved in each one. In these cases the rule of reason was applied but given a restricted application. The turning point in these decisions insofar as price-fixing was concerned hinged upon the distinction between agreements which "affect" prices and those which "fix" prices. The distinction at first blush may appear to be a very narrow one. Upon further scrutiny it will be found a very real one. It is the failure of many students of the law to understand clearly this distinction based upon practical considerations which has led to much of the confusion and unwarranted criticism of the Supreme

Court's decisions in anti-trust cases in recent years. As a consequence, business and the bar, following the decision in *Appalachian Coals, Inc. v. United States*, 288 U. S. 471, jumped to the conclusion that the Supreme Court had adopted a much broader view of the rule of reason in loosely-knit combination cases and in so doing would apply the economic tests in determining reasonable and unreasonable market controls. The decision of Justice Douglas in the *Socony-Vacuum* case has finally laid to rest many of the mistaken notions which were held by both lawyers and business men. We now know that our courts will follow the legal concept of monopoly and restraint of trade. What we failed to glean from the *Appalachian Coals* case was the attempt by the Court to underscore a growing legislative policy based upon the necessities of a changing economy. In simple terms, that policy was and is the fostering of cooperative action by producers of commodities even though a necessary incident of such action is the restraint of trade. Stated in other terms, cooperative action by producers should be accorded more liberal treatment under the anti-trust laws.

I hasten to point out that the foregoing conclusions represent my own personal views. Other lawyers may arrive at different conclusions as a result of their study of our case law. Only with great temerity will the anti-trust lawyer predict the decisions of our courts in marketing agency cases. This lack of certainty is most confusing to the average man in business. His inability to obtain in ad-



Marketing agencies function to promote efficiency in the distribution of natural resource products.

PHOTO, NORFOLK & WESTERN RY

vance a determination of the legality of his proposed activities gives rise to the present necessity for further legislative action. In considering such action the method of control to be employed deserves serious thought.

Cooperative Action by Agricultural Producers Freed from Shackles of Anti-Trust Laws

In 1914 Congress passed the Clayton Act. Section 17 authorized the formation of unincorporated non-profit agricultural and horticultural organizations operated for the mutual benefit of the members. In 1922, in passing the Capper-Volstead Act, Congress extended the exemption granted in the Clayton Act to capital stock companies and lodged with the Secretary of Agriculture the duty of initiating a quasi-judicial proceeding again qualifying companies whenever he had reason to believe there was "monopolization or undue enhancement of prices." In 1926 Congress passed the Federal Cooperative Marketing Act, and in 1929 the Agricultural Marketing Act, both of which authorized the cooperative marketing of agricultural products and the making of the necessary agreements for the conduct of their marketing activities. Thus, by 1933 Congress had made manifest its determination to free from the shackles of the anti-trust laws cooperative action by the producers of agricultural products. This determination was occasioned by the depressed state of the industry, the size of the individual units, their

inability to maintain adequate marketing machinery and the competitive advantages flowing from concerted action through marketing agencies.

In granting exemption from the anti-trust laws to agricultural marketing agencies, Congress recognized that these agencies would of necessity have to determine prices, develop improved marketing methods, establish distribution programs gauged to the interplay of the factors of supply and demand, and inaugurate sales promotion plans designed to expand old markets and develop new ones. It further recognized that these activities could only be attained by agreement among the members thereof, and, therefore, such agreements under our legal concept of restraint of trade might be held to violate the anti-trust laws. No definite distinction had as yet been made and established between the fixing of prices and the determination of prices. Congress simply recognized that, in the case of agricultural producers, cooperative action, even though it might result in restraint of trade, was a necessity if these producers were to be permitted to survive in our changing economy and if the consuming public were to be given an adequate supply of their products.

In authorizing the formation of agricultural marketing agencies, Congress did not take away judicial control over the enforcement of our anti-trust laws. In the statutory grant provision was made for the intervention of the head of an execu-

tive department whenever he had "reason to believe that monopolization or the undue enhancement of prices" had occurred. Prior approval of intended acts was not made a part of the statutory authorization. No strait-jacketing restrictions, such as rules or regulations governing the conduct of the members or of the agency, were imposed. The nature of the industry, coupled with the aims and purposes of the cooperative effort, were deemed sufficient reasons for legislative exemption in view of the provision for administrative control should abuses arise. Thus, in determining restraints by agricultural producers the standard was shifted from price-fixing to the undue enhancement of prices. Price-fixing by groups was legalized and full emphasis placed upon the effect of the cooperative action upon prices.

Thus, the stage was set for judicial sanction of marketing agencies operating without benefit of specific statutory, authorization, and the drawing of a line of demarcation between cooperative action by producers of natural resource products and the concerted action of others, either through combinations by fusion or loosely-knit trade associations. On March 13, 1933, this sanction was given in *Appalachian Coals, Inc. v. United States*, 288 U. S. 471.

(Part Two of Mr. Vesey's article which discusses the importance of the "Appalachian Coals" case and other aspects of this problem, will appear in the November issue.)

Steep Rock Lake Operations

THE first shipment of ore from Steep Rock Iron Mines, Ltd., came out of the open-pit mine in early October and moved over the new spur line of the Canadian National Railways on its way to Cleveland, Ohio. This achievement took exactly half of the three years originally estimated. Development of the property was speeded up because of the urgent demand for high-grade ore by Allied war plants. The shipment of 1,400 tons required a train of 27 cars. Two hundred and fifty new all-steel 50-ton ore cars were built for the C. N. Rwy. to handle this traffic. Present plans call for a trainload of ore daily and production soon to be doubled.

Dr. M. W. Bartley, geologist and production manager, estimates that five million tons of ore will be produced yearly at full capacity.

Steep Rock ore is high-grade and the Canadian Government considers it as a priority war project, authorizing the building of the spur line into the property and construction of the

modern ore-loading dock at Port Arthur.

The ore is being taken from the bottom of Steep Rock lake located just north of Atikokan and approximately 150 miles southwest of Port Arthur. Two lakes had to be diverted and the course of another reversed, requiring new man-made channels and the blasting of two large rock cuts; the draining of parts of Steep Rock lake, which

involved 72 billion gallons of water; the installation of specially-designed equipment to bring the ore from the lake to the railway cars; and the construction of 23 miles of road to reach the various diversion projects, and an 8,000-ft. haul road on the drained portions of the lake. Photo shows part of 300,000 g.p.m. drainage which has already dropped the lake level 120 ft., with 90 ft. to go.



The Three Kids Mine

THE Three Kids Mine near Las Vegas, owned by the Manganese Ore Company, wholly-owned subsidiary of The M. A. Hanna Company, has proved to be the largest open pit deposit of good grade manganese ore available in America, Vice President M. C. Lake of the ore company said in a recent statement.

While the mining operation has exceeded expectations in ore quality and tonnage, the Defense Plant Corporation plant adjacent to the mine designed to beneficiate the ore is not yet in full-scale production.

This plant, employing a chemical process never before attempted on a large scale, is reported to have produced several thousand tons of the highest grade manganese nodules ever made, but full production is now being delayed because of mechanical difficulties encountered in operations. These difficulties directly result from the fact that many substitute materials had to be used in construction, because alloy steel and other acid-resistant materials were more urgently required in other war uses.

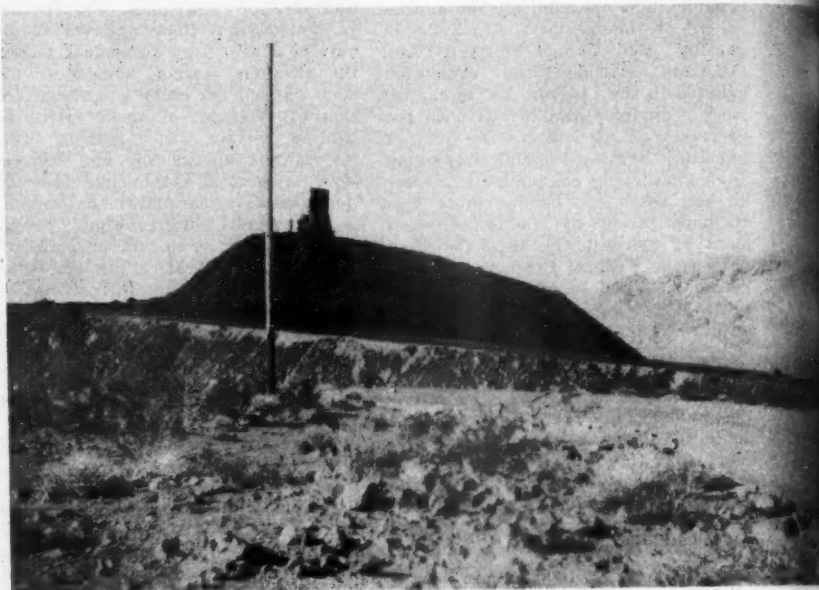
In some cases proper materials are now slowly being obtained, and in other cases new and improved substitutes are being developed, so that replacements are being made as rapidly as necessary.

A group of government and private experts who are acting as consultants in the operation visited the mine and plant recently. They included William C. Browning and S. B. McCluskey of Metals Reserve Co., Los Angeles; W. C. Badger of Dow Chemical Co., Ann Arbor; John D. Sullivan of Battelle Institute of Columbus; D. N. Nedensky of Pan American Engineering Co., Berkeley, and Dr. G. E. Seil of Day & Zimmerman, Philadelphia. A. A. Hoffman is General Manager and H. L. Hazen is Plant Superintendent. Officers of Manganese Ore Company were also present.

The process used in plant operations was described by Mr. Lake as follows:

"The ore, after careful blending, is finely dry-ground and leached in a combination of towers and agitators with a solution of sulphur dioxide to yield a concentrated solution consisting primarily of manganese sulphate. The leached pulp is countercurrently washed in a series of seven thickeners, the first two of which are acid-proof construction and 250 ft. in diameter, thus making them the largest acid-proof thickeners ever constructed. The leach solution, after neutralization, is evaporated in quadruple-effect evap-

Leaching plant, built for the Government by the Manganese Ore Company, employs chemical process not previously attempted on a large scale



Truck dumping manganese ore on storage dump near the concentration plant



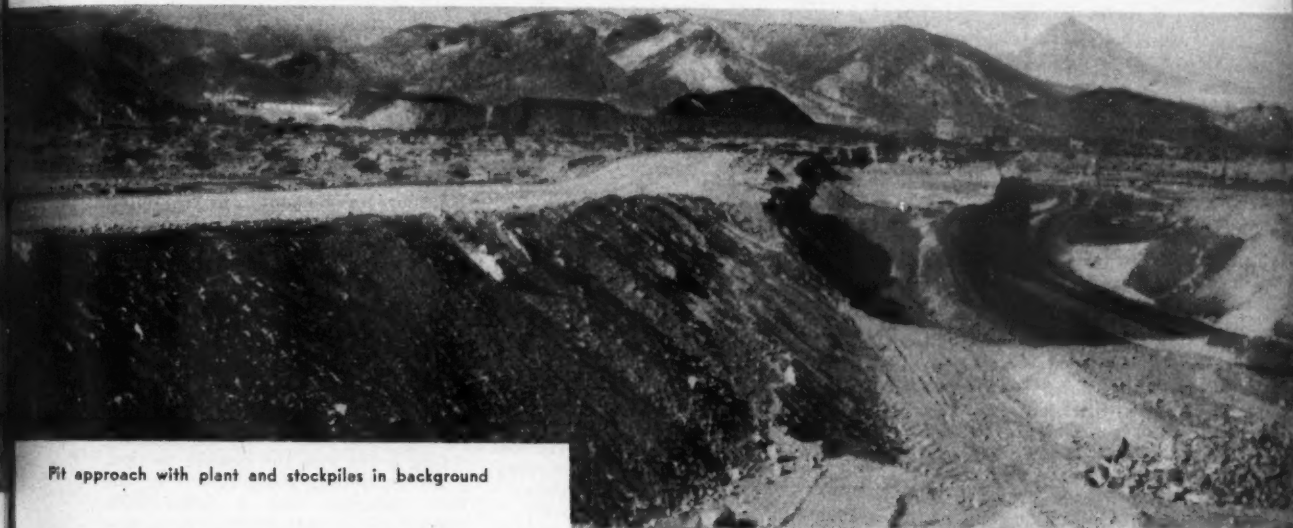
Ore loading operations at the Three Kids mine



Primary drilling is done by churn drills; secondary drilling by rock drills



General view of open pit mining operations



Pit approach with plant and stockpiles in background



Loaded ore truck approaching leaching plant

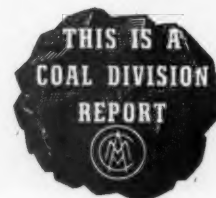
orators to produce manganese sulphate salt which is roasted in a rotary kiln 360 ft. long by 11 ft. 3 in. in diameter, to yield a calcine of manganese oxide and sulphur dioxide gas. The gas is used in the leaching towers to extract additional manganese from ore. Miscellaneous sulphur dioxide losses in the process are made up by burning sulphur. The manganese oxide from the roasting kiln, while still hot, is transferred to another smaller rotary kiln where it is nodulized to give a product suitable for making high grade ferromanganese and other products. The nodules contain 65 percent or more of manganese.

"The development of the manganese ore mine has shown that the original estimates of the amount and quality of the deposit were most conservative," Mr. Lake said. "The company has now delivered, or has already stripped and available for immediate delivery, ore exceeding the full contract quotas both in tonnage and grade. All ore contract obligations have been completely performed on or ahead of schedule."

Recovery of Fuel Values

From Rejects

Reports by the Committee on Surface Preparation describing methods used to reclaim coal that formerly was wasted on the surface slate dumps or in the gob underground



Tests on Complete Seam Loading

THREE mines are operating mobile loading machines in the Pittsburgh seam where approximately one foot of draw slate is handled. The usual practice is to gob part of the slate underground in rooms and to load the balance into mine cars which are taken to the outside and dumped. A certain amount of roof coal frequently comes down with the slate and in order to determine the practicability of handling this refuse mechanically and recovering its coal, some tests were made at these operations in which the draw slate and roof coal were loaded together as they occurred at the working faces underground and treated at the surface cleaning plant. This material was tested by itself and was not mixed with the regularly mined product.

As shown in the following table, summarizing the results of the tests, the coal recovered amounted to 23.6 percent, 28.8 percent and 18.4 percent of the refuse treated at each of these mines. However, because of the inclusion of large amounts of inherently high-ash roof coal, which lies above the draw slate, the quality of the reclaimed product was much inferior in both size and ash content to that normally produced at these mines.

As the preparation plant normally handles coal that contains 15 percent to 18 percent refuse, in the tests from Mines "A" and "B" it was necessary to reduce the feed to approximately one-third that of the regular tonnage. Some of the pieces of slate were of such size—5 ft. x 3 ft. x 1 ft. thick—that they had to be broken before reaching the cleaning plant and even at the low feed rate considerable difficulty was experienced in handling the large quantity and excessive sizes. In two of the three tests it was found

easier to pick the coal from the slate on the plus 4-in. size, while in the other test the plus 4-in. slate was removed in the regular manner. But it was necessary to rehandle this coal which resulted in an increased amount of breakage over normal and the picking tables and refuse conveyors

MINE A		
	Slate Feed Percent	Clean coal recovered Percent
Plus 4-in.	33.1	6.7
Minus 4-in.	66.9	31.9
Total	100.0	23.6
Ash content, per cent.	10.8*	

* 7 percent ash in normal cleaned R.O.M.

MINE B		
	Slate Feed Percent	Clean coal recovered Percent
Plus 4-in.	39.6	8.3
Minus 4-in.	60.4	43.8
Total	100.0	23.8
Ash content, per cent.	12.5*	

* 7.4 percent ash in normal cleaned R.O.M.

MINE C		
	Slate Feed Percent	Clean coal recovered Percent
Plus 4-in.	44.1	7.9
Minus 4-in.	55.9	26.6
Total	100.0	18.4
Ash content, per cent.	12.5*	

* 7.1 percent ash in normal cleaned R.O.M.
Minus $\frac{3}{4}$ -in. not cleaned.

were overloaded, frequently causing many delays.

The mechanical equipment at the cleaning plant where these tests were run was not built for handling such heavy material and undoubtedly it could not stand the strain of continual operation under this load without a considerable amount of rebuilding. The refuse boxes were frequently over-loaded even at the reduced tonnage and it was often necessary to shut off the feed in order to clear out the refuse from the cleaning unit and although the tests were of short duration, there was evidence of increased contamination in the waste system. In the one plant where a rewash unit was operating, practically all the feed went down the primary refuse boxes into the rewash section.

But in spite of these difficulties, the tests indicated that a considerable amount of coal can be reclaimed, particularly in the minus 4-in. to plus $\frac{3}{4}$ -in. size range. The plus 4-in. constitutes approximately 35 to 40 percent of the total mine slate product but this contains only from 7 to 8 percent of recoverable coal. The minus $\frac{3}{4}$ -in. runs from 35 to 40 percent ash and it is doubtful whether it would be advisable to attempt to treat this product—a wet washer would involve expensive water settling and filtering equipment and its capacity would have to be disproportionately large so as to handle the high percentage of clay that would be involved.

However, it seems conclusive that the $\frac{3}{4}$ -in. by 4-in. range offers possibility for economical treatment and these sizes constitute approximately 16 percent of the mine slate output. It would further seem advisable, due to the high inherent ash content of the coal that is loaded with the mine slate, to design a special "rougher" cleaning unit for primary separation and then feed the primary product into the regular cleaning plant with the regular raw coal. Thus the overall ash of the clean coal would not be increased to an appreciable extent.

Sludge Recovery in Illinois

THE recent installation of a laundertype fine coal washer for re-washing sludge at a coal washery in central Illinois has resulted in recovering a considerable amount of high quality coal formerly discarded. All the coal is washed in jigs, and, in the dewatering process, the fine-size fractions, under one millimeter approximately, are delivered to a settling tank with the circulating wash water. Very fine impurities such as semi-colloidal fire-clay are carried in suspension in the wash water and, at least in part, settle out in the tank with the fine coal. The washery sludge is thus so contaminated as to be unmarketable, and was therefore wasted.

The new rewash circuit receives the product from the settling tank and returns it to the washed coal loading system, deslimed at approximately 60-mesh and with the ash content reduced between 1½ and 1 percent below that of the plus 1 mm. washed coal.

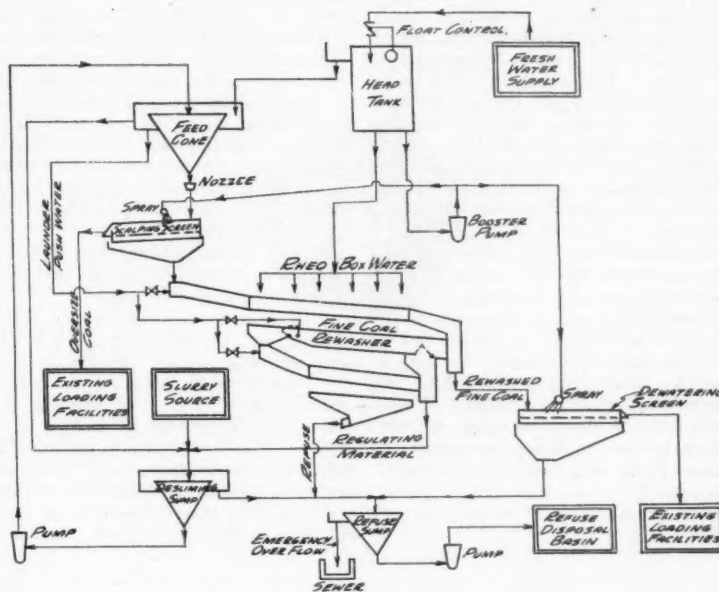
In the rewash circuit, the sludge from the settling tank is hydraulically deslimed at approximately 60-mesh and pumped to a feed surge cone which also provides some thickening ahead of the rewasher. Overflow from the feed cone serves as push water for the washing launders, any excess returning to the desliming sump. A nozzle type withdrawal valve regulates the discharge from the surge cone.

In order to protect the Rheo boxes of the rewasher from oversize, entering the circuit accidentally, a vibrating scalping screen with $\frac{1}{4}$ -in. square mesh jacket is inserted between the surge cone and the receiving launder of the rewasher.

The rewashed product from the top launder is dewatered over a vibrating screen and delivered to the washed coal loading facilities of the main washer. A special "skimming" gate permits the top portion of the product of the middle launder also to go out with the washed product. The remainder of the middle launder product and all of bottom launder product are sluiced back to the desliming sump for recirculation as "regulating material," providing a semi-automatic control of the washer operation.

Refuse from the rewasher is sluiced to a refuse sump which also receives the overflow from the desliming sump and the underflow of the rewasher coal dewatering screen as well as the overflow from the settling tank of the main washer. A refuse disposal pump discharges all this reject into a remote disposal pond.

The fresh water supply for the re-washer circuit is delivered to a con-



Flow diagram for fine coal rewashing system—Submitted by Myron W. Mellor

stant head tank, through a float-controlled butterfly valve which automatically adjusts the water delivery to the operating requirements. Bottom water for the wash boxes is taken

directly from this head tank while a booster pump also connected to the head tank provides high pressure spray water for the scalping and dewatering screens.

New Plant Recovers a Former Waste

A NEW washing plant has recently been installed in southern West Virginia with special provision to reclaim coal that had formerly been wasted at the outside refuse dump. The seam mined at this operation contains a slate or bone parting which does not have a clear cleavage separation from the coal; consequently there are many pieces of this slate, particularly in the larger sizes, that come to the tipple with 2 or 3 in. of coal adhered to one or sometimes both sides. Such pieces are picked out by hand from the lump and egg sizes but on account of the large quantities involved it is impossible to save the coal by splitting it off with an axe or pick, so there was no choice, before the new cleaning plant was built, except to send all of this product to the slate dump. This material amounted to approximately 20 percent of the total refuse and as each lump usually contains more coal than slate, the coal loss from this source was considerable.

The cleaning plant was designed to eliminate this loss. The lumps of

slate with adhering coal are picked by hand as before but this product now goes to a crusher where it is broken down to minus 2-in. and sent to the wash boxes. The washing performance has proven efficient; recent tests at 1.5 specific gravity show an average of 2.2 percent of sink in the clean coal which has an average ash of under 6 percent and the refuse contains an average of 3 percent of float with an ash content of around 15 percent. Most of this float comes from the light middle gravity slate occurring in the 3-in. by 2-in. and the 2-in. by 1-in. sizes.

The results of the mechanical preparation are reported as very satisfactory by the company. The value of the merchantable coal reclaimed from the former reject is an appreciable item and the cost of installing the facilities to recover this loss was not large as these were included in the plant design. This plant incidentally has blending arrangements for making diversified products which are expected to prove especially advantageous in the post-war market.

Reclaiming High-Ash Coal

THE Upper Freeport Seam, in a limited section of western Pennsylvania, carries a "rider" or upper bench of coal and what is called "bone" above the normal thickness of the seam. The normal thickness is about 50 in. and this extra thickness runs from 20 to 40 in. The section where this unusual seam is found is known as the Thick Freeport district. The portion is really high-ash coal but is called bone for want of a better name.

The bone takes the place of roof slate as found in the normal Upper Freeport seam, the thickness varying, as does the bench of coal above it. The bone is often 16 in. thick, and it is often difficult to locate its upper limit as it seems to blend into the upper coal, the percentage of ash content of it being greater at the bottom where the line of demarcation between coal and bone is more pronounced. The bone varies in ash content from about 25 percent to 40 percent.

Various methods are used in the attempt to prevent bone being loaded with the coal, the two systems most popular are (1) cutting it out with Universal type cutting machines or (2) working the coal in benches, that is, loading out the coal below it, then shooting it down to be loaded into bone cars or gobbed in the working place; after disposing of the bone the upper coal is mined. By mining in steps a full cut of coal can be loaded at the same time.

Either of the above methods does not prevent bone being loaded with coal or coal with the bone.

The bone in the coal can be taken care of by the use of picking tables and cleaning plants, but the coal in the bone finds its way to the refuse dump and is lost. In picking the bone from lump coal it is often difficult to fully recognize it and doubtful lumps and lumps with coal adhering to them go into the refuse bin. To cure this waste of good coal, cleaning plants have been installed.

The refuse is crushed and cleaned and the cleaned product is blended into the coal which has gone through the main cleaning plant.

Because of war demands, it has been difficult to get cleaning equipment; and, realizing that something should be done to use the fuel value in the discards, one operating company built a separate tippie in which was installed a bin and plate feeder, a picking table, a crusher and storage bins for cleaned product. All the equipment used was second-hand. The refuse is hauled from bins to the picking table, all foreign matter is removed, and this material is then crushed to 1-in. and put into the bin for car loading. This product analyzes about 20 percent ash. It was necessary to find a market for this product—which has been accomplished—and this make-shift tippie has done away with the necessity of hauling large quantities of good fuel to the refuse bank, and has given a return to the operator for what was formerly an expense.

Salvage of Coal From Mine Refuse in the Pittsburgh District

By **THOMAS FRASER**
J. A. KELLEY
H. G. GRAHAM

THE threat of acute fuel shortage during the period of high wartime demand calls for a careful appraisal of all possible sources of coal supply. The limited number of skilled mine workers undoubtedly constitutes the bottleneck that limits our prospective coal production. This condition lends especial interest to the possibility of salvaging fuel from mine refuse and such waste materials that are already being mined and delivered to the surface. Obviously, any coal that can be recovered from these materials can be obtained without any additional miners.

In our usual mining practice, developed during normal peacetime periods of highly competitive coal production, it is a common thing to discard varying proportions of unmarketable material ranging from actual

refuse to slightly off-grade coal. It is difficult to combat these causes of fuel waste under the normal condition of over-supply of high-grade coals available at low prices. There is often no place in the market for second-rate coals at a supportable price level. In periods of emergency, however, these coal reserves would be very useful, and, having once been placed in production, they might continue to move on short hauls in peacetime.

This report describes a study of available coal in mine refuse in the Pittsburgh district of western Pennsylvania. In that region, certain structural features of the Pittsburgh coal bed that prevail generally over a wide area have brought about a mining practice that results in a substantial production of coal-bearing mine refuse.

The condition with regard to coal-salvaging opportunities in the Pittsburgh area has its counterpart in many other bituminous coal-mining regions. Similar conditions prevail

in the adjoining parts of Ohio and West Virginia where the Pittsburgh bed is worked. Large quantities of off-grade fuel are discarded in mining the thick Freeport bed in western Pennsylvania and in some parts of the Pond Creek seam and the Elk Horn seam of the southern Appalachian region; and it is common in many regions to discharge the machine cuttings and clean-up coal from inferior parts of the seams. These are only a few of the well-known examples of waste-fuel resources.

Summary

1. At mines operating in the Pittsburgh bed, it is the common practice to gob on the surface a substantial tonnage of coal-bearing mine refuse coming from falls of roof, clean-up of roadways and working places, and hand-picking rejects.

2. The tonnage and coal content of this material are much greater at mechanized mines than at hand-loading mines, and the total production of such material in the field as a whole is increasing.

3. At hand-loading mines, the proportion of gob to marketable-coal production is generally under 1 to 20, but at mechanical loading mines it may be as high as 1 to 3.

4. Estimates of tonnage and coal content are based upon a rough average of one car of rock to ten of shipped

Extract from U. S. Bureau of Mines R. I. 3768, giving the conclusions formed from a complete field investigation in western Pennsylvania, including coal analyses, float and sink tests of numerous samples from mines and refuse dumps.

coal and 20 percent merchantable coal in the refuse. Upon this basis, it is estimated that there is a production of at least 20,000 tons a day of mine refuse, considering only the large mines that produce enough to justify consideration of salvaging operations. This refuse is estimated to contain 4,000 tons per day of recoverable coal suitable for general industrial use.

5. Hand picking and washability tests indicate that the separation required to salvage this coal is in the moderately difficult category, and it is feasible to recover the coal by using commercial washing equipment or by hand picking.

6. Some typical samples of float coal recovered in tests of mine refuse analyzed around 10 percent ash, 13,500 B.t.u. per pound, and 2,480 degrees F. ash-softening temperature.

7. Experience in operation of washeries on similar material in other fields teaches that the material-handling equipment must be built very

rugged to withstand hard service in such a plant, and refuse-discharging and disposal facilities must have larger capacity than the conventional washery designed for coal.

8. Estimates of cost of salvaging the coal by hand picking indicate that the ratio of initial investment cost to daily production is the dominant factor in economy of operation, with a minimum of 300 tons per day of available raw material representing the marginal condition. With larger tonnages of raw material than that, a project may have profit possibilities.

9. In addition to furnishing a source of quick coal production for war needs, the salvaging of coal from mine refuse in the Pittsburgh area appears to have a role of growing

importance in the future expansion of mechanical operation and concentrated low-cost mining. The present trend of development is strongly toward full-seam mining and large-scale bulk handling of the material.

As the unit cost of production in the mine goes down owing to these developments, there is a concurrent trend toward decrease in yield of merchantable coal per ton of raw material, which offsets to some extent the advantage of the lower production costs. As these two factors increase with the expansion of mechanization, recovery of additional coal by treatment of the increasing volume of mine rock may assume vital importance in swinging the balance to the credit side.



Recovery of Refuse Product Made in Selective Mining

A MINE in western Pennsylvania that is operated primarily to produce metallurgical coal is working a seam about 7 ft. thick that is divided into three benches—the top bench of 26 in. and the bottom bench of 33 in., are high grade coal but the middle section of from 12 to 16 in. contains some bone and high-ash coal that makes it unsuitable for metallurgical purposes and must therefore be kept separate from the remainder of the seam. This separation is made at the working faces by taking two machine cuts in the middle section and loading out the cuttings, into mine cars as a separate product. The top and bottom sections of high grade coal are then shot down and loaded for metallurgical fuel.

The two products, which of course are loaded separately into mine cars, and hoisted separately at the shaft, are diverted at the top of the tippie—the metallurgical coal going direct to the screens and picking tables and other preparation facilities before loading into railroad cars and the reject is sent to a special cleaning plant. This reject coal is suitable for steam purposes but its high ash content reduced its combustion efficiency and further added to the transportation cost, so that a separate cleaning plant was installed for this product. This

cleaning plant uses both the wet and dry processes.

The product is dumped on to a bar screen with 3-in. openings. The oversize is hand-picked and thence passes to a crusher whose product is re-mixed with the undersize 3-in. screenings. These are fed onto screens which separate into three sizes: plus 1½-in. 1½ x ½-in. and minus ½-in.

The plus 1½-in. is sent to the crusher. The 1½ x ½ goes to wash boxes; the minus ½-in. is rescreened over a ¼-in. cloth. The oversize from this screen also goes to the wash boxes. The minus ¼-in. goes to air cleaning units that are equipped with a dust collector. These processes make a 1½ x ½ cleaned product reduce the ash which is from 19 to 21 percent in the rejects to approximately 12 percent and the total recovery amounts to nearly 60 percent of the bone and other cuttings delivered to the surface.



WHEELS OF GOVERNMENT



As Viewed by A. W. DICKINSON of the American Mining Congress

THE congressional adjournment until after November 14 came on the evening of September 21, following what may have seemed to the overall membership of the House and Senate to be a rather dull eight weeks' session but which, nevertheless, to those concerned with demobilization and surplus disposal bills and particularly the stockpiling features of the surplus legislation, seemed a prolonged whirlwind of alternate peaks of action and suspense. Wide differences of opinion between Senate and House conferees on both of the bills delayed the departure of Congress from Washington for a week beyond the time set by the Capitol leaders.

Demobilization

Discarding the grant of unemployment benefits to Federal employees in arsenals and shipyards and the proposed travel allowances for war workers to proceed to new jobs or to their homes, Congress gave final approval to the George reconversion bill. As enacted the measure provides for an Office of War Mobilization and Reconversion having general powers over the Office of Contract Settlement and the Surplus War Property Administration. Provision is made for non-interest bearing loans to permit States and municipalities to plan postwar public works, and the solvency of State unemployment compensation funds is guaranteed; also provided is a Retraining and Reemployment Office designed to coordinate the work of agencies now engaged in these activities.

Surplus Disposal—Stockpiling

As finally approved by the President about 5 p. m. October 3, the Surplus War Property Disposal Bill, over which the Senate and House conferees had been engaged in prolonged controversy, provides a three-man administrative board subject to the final ruling of the Director of War Mobilization in matters involving cooperation with other Government agencies. Stated purposes to be followed in disposal of property are the protection

of post-war industry and employment, as well as the protection of free markets and competitive prices from dislocation resulting from uncontrolled dumping; also specified are the utilization of the productive capacity of the natural and agricultural resources of the country together with the maintenance and encouragement of a healthy competitive economy.

The embattled stockpiling section which has now become Section 22 in the law as enacted, emerged with the phrase "strategic minerals and metals" defined to include copper, lead, zinc, tin, magnesium, manganese, chromite, nickel, molybdenum, tungsten, mercury, mica, quartz crystals, industrial diamonds, cadmium, fluorspar, cobalt, tantalite, antimony, vanadium, platinum, beryl, graphite—without limitation as to quantities—together with "aluminum or any other minerals or metals in such quantities or amounts as the Army and Navy Munitions Board may determine to be necessary for the stock pile . . ." Included are ores, concentrates, alloys, scrap, and partially and completely fabricated articles suitable for stockpiling. Once declared surplus and placed in the stockpile, minerals and metals therein are subject to the provision of the Act of June 7, 1939 (Thomas Stockpiling Act), to be released only upon order of the President in time of war, or in the event of a national defense emergency arising from the threat of war.

Under an added subsection (b) the War Production Board may, if it finds it necessary, protect civilian industry by withholding amounts of the respective minerals and metals equal to the estimated deficiencies for non-war production for a six-months period, to be disposed of "to the extent necessary to meet any such deficiency actually found to exist by the WPB, at the market price of the respective minerals and metals." Also provided is a subsection (c) under which strategic materials other than minerals or metals may be frozen in stockpiles when declared surplus; the Army and Navy Munitions Board has full discre-

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Washington Highlights

CONGRESS: Adjourned September 21 to return November 14.

DEMOBILIZATION: Conservative law enacted.

STOCKPILING: Law freezes metals and minerals declared surplus.

PIPELINES: Government oil lines may bring gas to Atlantic seaboard.

COAL WAGES: Miners' convention demands pay boost with 7-hours underground and 5-day week.

GOLD: Shut-down order L-208 to be lifted.

STEEL WAGES: Government wage stabilization to continue.

ST. LAWRENCE: Seaway and power project revived.

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tionary authority over retention and disposition of these materials.

Placed in the bill at the insistence of the House conferees, subsection (d), which almost resulted in recommitment of the bill, stipulates that the Army and Navy Munitions Board shall within three months from the date of enactment recommend the maximum and minimum amounts of the respective minerals or metals which are to be held in the stockpile; thereafter Congress is allowed twelve months within which to enact permanent stockpile legislation, and if this is not done the Surplus Property Board may then proceed to disposal of minerals and metals subsequently declared surplus by the Government's owning agencies.

A further point of interest to mineral producers in the legislative course of the bill was the striking out, by watchful Senate and House conferees, of the attempt made by the Interior Department to reserve all oil, gas, and other mineral deposits in lands sold as surplus. Presumably the plan was to handle such reserved minerals under a leasing system, but the conferees agreed that mineral rights should go with the land.

Pipeline Menace

One feature of the Surplus Property Disposal Act of great importance to anthracite and bituminous coal producers, transporters, and distributors

is contained in the provision affecting pipeline disposal. It is well known that the large lines built by the Government for emergency transport of oil to the eastern seaboard can also be used for the transportation of natural gas from the heavy producing fields of the west and southwest. Within three months after enactment the Surplus Property Board is required to submit a report to Congress on pipelines subject to disposal including an outline of the economic problems that may be created by their disposition and recommendation for their disposition or use. The law states that no disposition shall be made or authorized until thirty days after such report has been made while Congress is in session, except that the Board may authorize any disposal agency to lease any such property for a term of not more than five years.

Coal Mineworker Activities

Apparently still firmly in the saddle as leader of the coal miners, John L. Lewis closed his convention of some 2,500 delegates in Cincinnati with approval of tentative demands for the new operator-miner contract of April 1, 1945. The mine workers have come out for a seven-hour portal-to-portal day and a five-day week which would approximate an effective working week of 30 hours, with underground travel time to be paid for at the full worktime rate. General understanding is that an increase of at least \$1 per day will be demanded in the basic scale, together with: continuation of a basic national wage agreement through the medium of collective bargaining; limitation of the number of supervisory and technical employees exempted in the wage agreement, and provision for the remainder in the wage schedule; union-made tools and explosives to be furnished by the employer; and that cessation of work to prevent the shipment of coal to a consumer while employees are on a legal strike will not be a violation of the agreement.

For the moment at least, the controversy over recognition of the supervisory employees' union of UMWA District 50 appears to have been dropped. Upon withdrawal of the mine workers' requests for further strike votes under the National Labor Relations Board the District of Columbia Federal Court has dismissed without prejudice the suit brought by a number of coal operators to restrain the Board from conducting these votes. It is anticipated that the 73 mines owned by 34 companies which are now in Government possession will soon be returned to their owners.

Gold Mining

Acting on the early September announcement of WPB's new chairman, J. A. Krug, that the coming removal of controls over civilian production is "designed to provide the utmost stimulus to reconversion when Germany is

defeated" and that "industry is to be allowed in its own way, according to the availability of markets, men, materials and parts, to do the swiftest and most effective job possible of restoring production, making whatever people want and affording maximum employment, just as quickly as possible" the American Mining Congress promptly pointed out to Mr. Krug that the policy outlined applies directly and with particular force to the gold mining industry, now idle for two years as the result of Limitation Order L-208. The response has been to permit gold producers to take steps to secure machinery and parts needed toward the resumption of production and Chairman Krug, in his response to the AMC communication, states that Order L-208 is being given particular consideration, and it is quite likely that it will be revoked on "X-Day."

After introducing a bill to permit newly mined gold and silver to be sold freely in foreign markets, Senator James G. Scrugham of Nevada in a Senate floor speech laid stress on the need of obtaining higher prices for gold with which to offset the tremendously increased cost of mining. The Senator quoted interesting figures from an article published by a leading financier of India, which tells of sales of gold by Britain and the United States at \$57.03 per ounce and the sale by the Indian Government of our lend-lease silver at prices up to \$1.09 per ounce. Scrugham voiced criticism of such sales when domestic producers are limited to \$35 per ounce for gold and 71.11 cents for silver.

Steel Wages

On the last day of September a sober-visaged group of CIO and AFL

leaders emerged from a White House conference, which has since been given significance by observers as having possibly ended the chance of revision of Government wage stabilization policy for the present. Release in midmonth of the 600-page report of WLB's steel panel on the demands for a 17-cent-an-hour wage increase, guaranteed annual wage, and many other costly changes in working conditions has been followed by further "final" hearings before the Board, with continued able refutation by steel managements of the claims of the unions. At one point in CIO leader Philip Murray's testimony before the Board, in quoting from an unpublicized OPA report designated by Administrator Chester Bowles as "preliminary and confidential," Murray was checked sharply by WLB Chairman Davis who struck all reference to the OPA report from the record, stating that there was "no such report in the record in the case and we know nothing about it."

St. Lawrence Project

Senator Aiken of Vermont revived action on his Great Lakes-St. Lawrence Seaway and Power Project bill on the last day of the Congressional session, September 21, by introducing the measure in the form of amendments to two rivers and harbors bills which have passed the House and are now on the Senate calendar. No legislative action can take place until the return of Congress on November 14, but it is generally believed that the rivers and harbors bills will become active in the November-December session. The attitude of the Administration in favor of Congressional approval of the St. Lawrence project is of course well known.



Interior, Library of Congress

Personals

Gloyd M. Wiles, who was formerly general manager of Park City Consolidated Mines Co., at Park City, Utah, and until recently in charge of operations for National Lead Co., at



Gloyd M. Wiles

Baxter Springs, Kans., has been appointed manager for the titanium-vanadium-iron operations of MacIntyre Development Co., subsidiary of National Lead Co., at Tahawus, N. Y. He succeeds Otto Herres, who recently returned to Combined Metals Reduction Co. as vice president.

A. A. Jenkins was elected vice president of Hanna Coal Company and the Jefferson Coal Company at the meetings of the boards of directors held September 19.

In addition to his new responsibilities, Mr. Jenkins will continue to serve as general sales manager of the Ohio Coal Department of the M. A. Hanna Company.

J. M. Johnson, chief engineer for the Oliver Iron Mining Co. on the Marquette range, has been appointed assistant superintendent of the company's Spruce mine at Eveleth, Minn.

At the meeting of the Salt Lake City Chamber of Commerce on September 11, M. D. Paine was named chairman of the mining committee and Horace U. Siegel was named chairman of the smoke abatement committee.

J. D. Harlan, mining engineer, 1283 East South Temple Street, Salt Lake City, has resigned the position of vice president and consulting mining engineer of the United States Smelting, Refining and Mining Company. In due time he expects to resume work at his profession.

On September 1, 1944, William L. McMorris, Jr., became preparation and research engineer for the H. C. Frick Coke Company and Associated Companies, according to an announcement by K. L. Konnerth, assistant to the president in charge of engineering.

R. J. Lund, director of the Miscellaneous Minerals Division of WPB, has resigned to become assistant director of the research department of Reynolds Metals Co., at Glen Cove, N. Y.

J. M. Bowlby, president of Eagle-Picher Lead Company, has announced appointment of R. L. Hallows as technical assistant to the president and production manager of the Pigment Division of that company. Hallows' most recent assignment was as superintendent of smelters of the subsidiary.

A. C. Nebeker, Prescott, has been reappointed to his former post of field engineer by the Yavapai Council of the Arizona Small Mine Owners' Association, effective October 1. He has served for some time as a consultant in Arizona for the War Production Board. Bahngrell W. Brown has left the position to enter private mining practice.

Ralph E. Kirk, manager of raw materials, Tennessee Coal, Iron & Railroad Co., has become president of the Birmingham, Ala., Engineers' Club.

Alvin W. Knoerr, formerly employed by the Sunshine Mining Co., of Kellogg, Idaho, has joined the editorial staff of *Engineering and Mining Journal*.

Russell H. Foss was recently appointed district sales manager for the New York District of Hazard Wire Rope Division of American Chain & Cable Company, Inc. Mr. Foss, who has been with the company for 6 years, will continue to make his headquarters at 230 Park Avenue, New York.

M. D. Howell, vice president, United States Steel Corporation of Delaware, recently announced the appointment of Howard E. Isham as assistant vice president. In addition to his new duties, Mr. Isham will continue as assistant treasurer. He first came to U. S. Steel subsidiaries in 1938 on the staff of Mr. Howell, then vice president of Carnegie-Illinois Steel Corporation. Previously he was associated with Sherwin Williams Company, Cleveland Cliffs Iron Company, and Firestone Tire and Rubber Company, his duties with these companies relating to financial matters.

John Edgar, who supervised the 6,500-ft. extension of the Treasury tunnel and initial development work for the Idarado Mining Co., near Ouray, Colo., has returned to the staff of Sunshine Mining Co., at Kellogg, Idaho.

S. M. Cassidy has been appointed vice president of the Weirton Coal Company, effective immediately, it is announced by T. E. Millsop, president



S. M. Cassidy

of the Weirton Steel Company. Mr. Cassidy, who resides in Uniontown, Pa., has been manager of the Weirton Coal Company since he joined the organization eight years ago.

Robert H. Carpenter has become mining geologist for International Smelting and Refining Co. at Salt Lake City. He was formerly on the staff of Anaconda Copper Mining Co.

C. H. Burgess has resigned from the Aluminum Division of the War Production Board to take a position with the United Engineering Corporation.

Ralph D. Pomeroy, vice president, budget officer and auditor of the Utah Fuel Co., Salt Lake City, has been elected to membership in the Controllers Institute of America. The Institute is a technical and professional organization of controllers devoted to improvement of controllership procedure.

John S. McGhee, formerly superintendent of Island Creek's Mine No. 22 at Holden, has been appointed general superintendent of Island Creek Fuel & Transportation Co., at Huntington, W. Va. He succeeds **W. A. Buchanan**.

M. R. Baker, assistant superintendent at Mine No. 22, has been appointed superintendent.

Perry D. Helser, chief of the magnesium branch of WPB, has been appointed secretary-treasurer of the recently organized Magnesium Association with headquarters in New York City.

Appointment of **Edgar C. Brandt** as assistant to the general manager of

the Crocker-Wheeler Electric Manufacturing Company, Division of Joshua Hendy Iron Works has been announced by **A. J. M. Baker**, general manager of the Crocker-Wheeler Division.

John R. Van Fleet—Last month's announcement should have stated that Mr. Van Fleet has been elected president of the *United States Vanadium Corporation*.

Sam J. Bates has been made manager of the Sandlick mines of the Wright-Holland Coal Co., at Whitesburg, Ky.

T. L. Joseph has been appointed administrative assistant (assistant dean)

for the Minnesota School of Mines and Metallurgy, University of Minnesota Institute of Technology. Dean **Joseph**, a native of Utah, has been at the university since 1919. He is author of numerous articles on iron ore, sintering and blast furnace practice and has won three national prizes of the A. I. M. E. for outstanding papers. He succeeds **Dean E. H. Comstock**, who retired early in the summer.

Hubert O. DeBeck, district manager and field engineer for Colonial Mica Corp., at Custer, S. Dak., has become assistant to the president with headquarters in New York City.

Obituaries

T. R. Johns, 78, retired vice president and general manager, Industrial Collieries Corporation, died September 28 at Johnstown, Pa. Mr. Johns retired in June, 1942, after 66 years of continuous service in the coal industry. He began his long and varied



career in the mining industry as a trapper boy and became one of the best authorities on advanced methods of coal mining. In addition to associations with several mining companies, he served on a number of advisory boards and held membership in the Engineers Society of Western Pennsylvania, the American Mining Congress, the American Iron and Steel Institute and the American Institute of Mining and Metallurgical Engineers.

W. W. Graff, 67, Negaunee district superintendent for the Cleveland-Cliffs Iron Company, died October 2 at Ishpeming, Mich. A graduate of Lehigh University, Mr. Graff has been affiliated with the Cleveland-Cliffs Iron Company since 1901. He began his work in the engineering department and in three years he became superintendent at Cliffs Shaft and Moro. In February, 1940, he became district superintendent.

Frank D. Aller, retired mining engineer, of Golden, Colo., died June 21, at Golden. He was a member of the class of 1892, Colorado School of

Mines. He retired from his position with American Smelting and Refining Co. in 1939. Among other important assignments he was in charge of Guggenheim interests at Antofagasta, Chile, for 18 years.

Dr. Walter Harvey Weed, 82, geologist and copper authority and editor of *Mines Handbook* from 1914 to 1925, died at Altadena, Calif., September 6.

Edwin M. Rogers, 85, pioneer mining engineer, formerly of Central City, Colo., died in New York City July 30. He was the son of the late Andrew N. Rogers, proposer of the Moffatt tunnel.

Edward M. Green, general manager, Jermyn-Green Coal Co., of Pittston, Pa., died August 11 at the University of Pennsylvania Hospital in Philadelphia. He was formerly superintendent for Jermyn Coal Co., later superintendent for Pennsylvania Coal Co. With William S. Jermyn, he later organized the Jermyn-Green Coal Co.

Dennis P. Woods, 59, consulting mining engineer of Spokane, Wash., died recently in a Spokane hospital. He was a member of the class of 1902, Washington State College, and was active in engineering work in the Pacific Northwest.

Dwight E. Woodbridge, 82, mining engineer well known for his work in exploring and developing ore deposits, died on July 15, at Duluth, Minn. He was deeply interested in the utilization of low grade iron ores and was active in the early work of beneficiation of low grade magnetite ores at Babbitt, Minn.

W. H. Schacht, 64, president and general manager of the Copper Range Company, died September 29 at Painesdale, Mich. Mr. Schacht was a graduate of the Michigan College of Mines, finishing there in 1904. He invented the Copper Range rotary impact crusher and took active part in

organizing and developing the Copper District Power Company of which he was president. He was also president of the Copper Range Railroad and held numerous other important posts in the community.

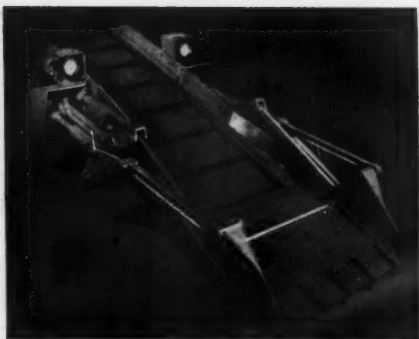
Harry C. Bacorn, well known Montana mining engineer and mine operator, died at Butte, September 23. Mr. Bacorn was born and educated in Illinois but spent most of his adult life in the mines of the western United



States. From 1916 to 1938 he was vice president and general manager of the Jardine Mining Company, thereafter taking care of his own interests. In 1942 he accepted a position as senior mining engineer with Metals Reserve Company in Washington, D. C., but gave this up some time ago because of failing health.

He was a charter member and former vice president of the Mining Association of Montana and also a member of the American Mining Congress, the A. I. M. E. and the Montana Society of Engineers.

Newton Cleaveland, 70, well known western mining engineer and dredge operator, died August 21, at his home in Berkeley, Calif. He was manager of the Rand Gold Dredging Associates and a partner in Dredge Placers, Inc. He was a graduate of Stanford University, class of 1899, and a past president of Stanford Alumni Association.



The loader with the natural, smooth, easy, shovel action loading head.

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It's times like these that prove the efficiency of any mining machine but never before have mechanical loaders, so brutally, been put to the test of performance. The Whaley "Automat" is meeting every punishing demand in double and triple shift work, whether in coal loading, whole seam mining, or rock and slate work. And, it's doing the job, turning out big tonnage day in and day out, at lowest maintenance cost.

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Jean Larue
has spent
45 years as
a coal miner,
the last 30
years in a
single mine, at
Pocahontas,
Va.
★



-- HAMILTON WRIGHT PHOTOS

Eastern



States

WEST VIRGINIA

» » » The opening of a new mine at Whittaker, on Paint Creek, which will employ 450 men and produce 2,000 tons of coal daily, was announced recently by officials of the Koppers coal division, Eastern Gas and Fuel Associates.

The mine will tap the Eagle seam and is located a mile from Whittaker on Toms Fork. The grading of a new road to the mine has been completed.

The new mine has been designated as the Powellton No. 3 Eagle and will produce coal to be used exclusively in metallurgical and by-products processes.

In announcing the opening of the mine, company officials pointed out that houses will be made available for new employees at their other nearby mining communities of Gallagher, Livingston, Standard, Glenn Huddy and Morton as well as at Whittaker.

Applicants for employment are being interviewed at the Koppers coal office at Gallagher and at the Montgomery USES office.

» » » The U. S. Bureau of Mines is establishing two new sub-district safety offices—one at Johnstown, Pa., and one at Fairmount, W. Va. The objective desired is to make it possible to assemble the inspectors and field safety workers into central offices instead of having them scattered about as at present. A number of advantages are expected to obtain from this new plan.

The sub-district office at Johnstown will serve Cambria and Somerset Counties and the Broadtop section of

Fulton, Huntington and Bedford Counties. E. R. Maize will be engineer in charge at the Johnstown branch.

The new office at Fairmount, W. Va., will serve northern West Virginia and will be under Dan Walker as engineer in charge.

PENNSYLVANIA

» » » The Imperial Coal Company's first-aid team of Coalport made a perfect score to win the first-aid meet Saturday evening, September 16 at the Barnesboro municipal stadium. A prize of \$210 was the reward to the winning team. Over 5,000 spectators were present.

The Bakerton No. 9 mine of the Sterling Coal Company took second place with a score of 99.73. No. 9

mine of the Redlands Coal Company at Hellwood was third; Marsteller mine of the Pennsylvania Coal & Coke Corporation was fourth; Barnes & Tucker Coal Company of Barnesboro was fifth. Other teams participating received \$35 each.

The Coalport team's perfect score is the second to be made in the history of first-aid meets for miners in this area. A team from the Ebensburg Coal Company of Colver made a perfect score at Portage a month earlier.

The principal speaker at the Barnesboro meet was H. B. Duffus, safety engineer of Westinghouse Electric and Manufacturing Company.

» » » Anthracite commercial production loss due to Labor Day was materially less than that of the previous holiday, the Fourth of July. Based on the average of six previous weeks the Labor Day loss was about 77,000 tons and for the Fourth of July holiday was about 355,000 tons.

» » » One leading anthracite company, studying the employment situation has found that of some 6,000 men employed, 870 entered the Armed Services and of these 75 men, or 8.6 percent have returned to the company.

» » » Administrator Ickes has announced the appointment of Ruben R. Davis as Assistant Regional Director in charge of anthracite. He succeeds E. L. Wilson, who resigned to resume his former position with the Lehigh Navigation Coal Company.

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» » » The following statement was recently made by Richard Maize, Secretary of Mines for Pennsylvania:

"A great change is taking place in the coal mines of the Nation. More and more is electricity finding a place in the mechanization of both anthracite and bituminous mines. While the need for it is obvious if the coal industry is to live and prosper, care, however, should be exercised so that the added fire hazards and new sources of gas ignition be safeguarded in all presently installed, or proposed electrical installations in coal mines.

"A condition never before recorded in the history of mining now exists in West Virginia, Pennsylvania and Ohio. In West Virginia the bodies of 16 men are sealed in a mine; in Pennsylvania there are six and in Ohio, 64. All are the result of mine fires caused by electricity.

"I respectfully urge every mine operator, mine superintendent, safety engineer and mine inspector to carefully check the electrical equipment in the mines under his jurisdiction and direct that such equipment be installed in a manner that will tend to reduce to a minimum the possibility of mine fires.

"So that you might not defeat your purpose when installing electricity in your mine, always remember that when an electrical installa-

10th ANNUAL COAL CONFERENCE

Pittsburgh, Pa., December 14, 15, 1944

A TWO-DAY conference of the Coal Division of the American Mining Congress will be held at the William Penn Hotel, Pittsburgh, Thursday and Friday, December 14 and 15, 1944. It is the Tenth Annual Conference of this Division and all coal operators and manufacturers of mining equipment are invited to attend. This general meeting of the Coal Division committees is to correlate the numerous and varied studies which are being constantly made for the service of the coal mining industry.

Each committee will present its report, reviewing the studies that have been completed and outlining plans for future activities. All this will be presented for open discussion and suggestions from those present. The subjects which will be presented will deal with operating phases of "Loading Equipment," "Belt Conveyors," "Dust Abatement," "Mine Ventilation," "Roof Sealing," "Recovery of Fuel Values from Mine Refuse," "Safety," "AC Power Underground," "Revision of Track Turn-out Standards."

The conference begins Thursday afternoon with the meetings of individual committees. The Group Conference will commence at 10 A. M. Friday, and will be followed by the annual dinner at which a guest speaker of national prominence will talk on a subject of special interest to the mining industry.

tion does what it is supposed to do and accomplishes its end it is efficient. Speed and production may be desirable, but they are only the frills of an efficiently installed equipment and will come as a natural result of proper installation. Installation is the first and most essential step."

» » » The Ninth Annual Meeting of members of Industrial Hygiene Foundation, an association of industries for the maintenance of healthful working conditions, will be held at Mellon Institute, Pittsburgh, the Foundation's headquarters, on November 15 and 16.

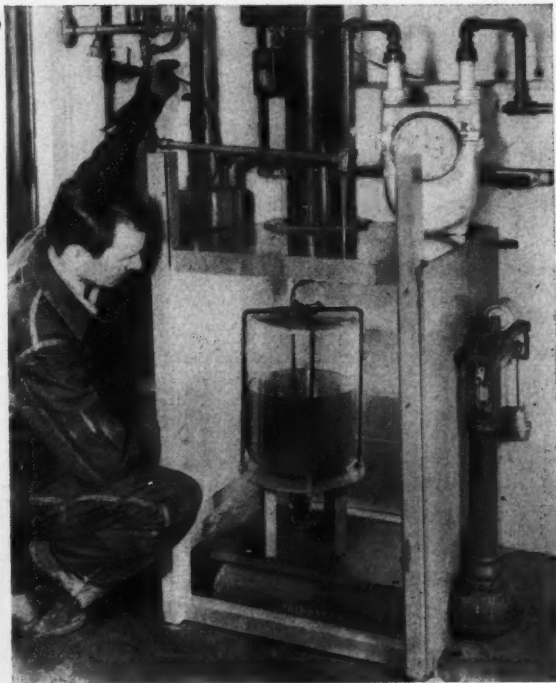
The panel on "Putting the Disabled Veteran Back to Work," which the Foundation pioneered at its 1943 meeting, will be continued and will report on helpful experiences which companies are now gaining in fitting the returning soldier to the right job.

» » » Releases by the Anthracite Committee indicate that landowners, lessees, and operators are taking advantage of the available means to reduce bootlegging. Since December, 1943, the Schuylkill County courts have granted several injunctions, restraining the mining of bootleg coal; other bootleg holes have ceased production because the Pennsylvania State Department of Mines insisted upon compliance with the mining laws of the state, and still other holes were closed by blasting or bulldozing them.

Approximately 2,000 men are now employed in this activity as compared with around 10,000 in 1941.

» » » Wilkes Barre, Pottsville, and Hazleton have been selected as the locations for the three meetings of the Pennsylvania-Anthracite Section of the American Institute of Mining and Metallurgical Engineers that will be held during the next year.

Mr. Edward Griffith, Vice President and General Manager of the Glen Alden Coal Company, will be chairman



The final stage in the experimental production of gasoline from coal—one of the projects being carried out by Bureau of Mines engineers at Pittsburgh

of arrangements for the Wilkes Barre meeting which will be held sometime during November.

Mr. William B. Wells, Mining Engineer and Estate Agent will be chairman of arrangements for the Pottsville meeting which will be held sometime during May.

Mr. Robert L. Klotz, District Manager of the Hercules Powder Company, will be chairman of arrangements for the Hazleton meeting which will be held sometime during July.

» » » After an outlaw strike by anthracite mine workers of several weeks' duration in the Shenandoah area of the Philadelphia and Reading Coal and Iron Company, the Government took over the operation of all of its mines. The action was regrettable, but it seemed to be the only way to end the strike after many conferences failed to settle the controversy.

The dispute involved the following: According to the agreement, when contract miners are unable to make wages on account of unfavorable mining conditions, the company is required to "make-up" their earnings to a certain minimum and under these conditions the workers are required to work a full day. The latter, the company claims, was not complied with by the miners, as many of them worked only a few hours a day.

ALABAMA

» » » Cotton ties are an important item in Alabama, as well as in all the other cotton raising states. The Tennessee Coal, Iron and R. R. Co., at its strip mill at Fairfield, turns them out in great quantities, on a schedule of 32 miles of ties per hour. They operate the fastest strip mill in the U. S., which turns out about two million bundles of ties each year, or a total of 60,000,000. They also furnish the buckles to secure the ties. Ties made at Fairfield are shipped to all parts of the country.

Strip mining operations are making good headway in the coal mining industry, and a large amount of coal is being piled up from operations of this type. Bituminous coal production in Alabama has shown some improvement of late, and is successfully meeting the various requirements of the Solid Fuels Administration.

KENTUCKY

» » » Plans have been announced for construction of what is expected to be the largest coal operation in Pike County, Ky. The Harman Coal Corporation will operate 40 miles east of Pikeville, with its tipple at Turkey Pen on Big Creek. Leases held are said to contain 52,000,000 tons.

The new operation will be equipped

for cleaning and sizing all grades of coal and is expected to begin shipments early in 1945.

» » » Ten thousand acres of virgin coal land owned by the Stonega Coke & Coal Company and the Blockwood Land Company are soon to be opened in Harlan County through an expansion program which involves some ten miles of extensions by the Louisville & Nashville R. R. Three to five mines are contemplated with an estimated daily output of 100 to 150 railroad cars of coal.

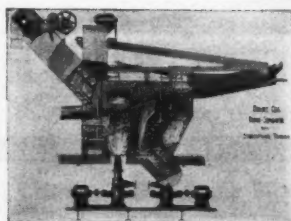
» » » The Clover Splint Coal Company of Closplint, Harlan County, has been purchased by Pittsburgh

Coal Company. The annual output is said to be 400,000 tons of premium domestic coal which is also used for industrial and coking purposes.

VIRGINIA

» » » The Pittston Company has acquired a controlling interest in the Clinchfield Coal Corporation, Dante, Va., through purchase of nearly 81,000 shares of the 135,000 shares of common stock. Nearly 2,500,000 tons of coal was mined by Clinchfield last year in addition to almost 300,000 tons mined by lessees.

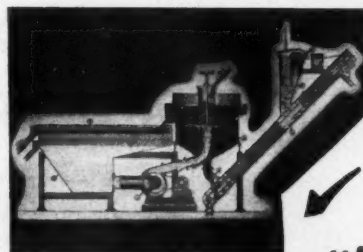
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A size for seams of any thickness

84A, 14" high, 7" lift

85A, 17" high, 10" lift

86A, 20" high, 13" lift

5-ton capacity. Toe lift on all sizes
lifts from a minimum height of 15 1/4"

These Simplex Jacks have been widely adopted as general purpose mine jacks—for re-railing locomotives, trackwork and for lifting and moving mechanical equipment. Added safety is inbuilt. Features include double lever sockets, stronger cadmium plated springs and links, shorter fulcrum centers, larger toe lifts, stronger pawls and trunnion bearings, and reinforced inner-rib housings. Other automatic lowering lever jacks in 10, 15 and 20-ton capacities.

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Jacks

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Better, Safer Jacks Since 1899

Central



States

TRI-STATE

» » » The Southside Mining Company has given the Cox Mining Company an operating contract for operation of its mill near Chitwood. Ore from the O'Jack Mining Company's properties on West Seventh Street near Hero's Crossing will be treated.

The O'Jack Company has completed a new shaft to 135 ft.—46 ft. below the former workings. A new derrick and 300-ton hopper has been set up over the new shaft and a larger compressor is contemplated. Luther Owens is ground foreman and C. W. (Tuck) Ritter will be in charge of milling operations.

» » » Messcave Mining Company has completed stripping overburden from a half acre of the Windsor tract on the Robeson land. This is north of Galena in the Short creek bottoms. Work is being done to prepare for expansion of mine operations.

An 8-ft. depth of overburden has been removed to uncover 4 ft. of ore. A 1½-yd. dragline with 50-ft. boom is being used with a Schramm compressor furnishing air for drilling.

A report from Marvin Robinson states that 8 to 9 percent recovery in zinc and lead is expected. The ore is being trucked to the Lucky Jack mill between Smithfield and Carl Junction.

Associates in the enterprise are H. W. Williams, E. A. Gaede and Don Gaede, all of Galena, and Cecil Larger of Picher and Glenn Richey of Carl Junction.

» » » F. W. Evans of Joplin is reported to have purchased the interests of the Cooley Brothers in the Sucker Flat open-pit mine in the south central part of Webb City. Pumps and the washing plant were acquired in the transaction as well as the tract of 76.5 acres.

Cooley Brothers, after suspending operations several weeks ago, have moved their electric power-shovel equipment to Colgate, Okla., for work on a coal operation. Originally engaged in dredging alluvial gold deposits in Colorado and Montana, the Cooley Brothers organization has excavated the local pit to a depth of 174 ft. in two years. Evans has emphasized the fact that the deposit is by no means exhausted and work will be resumed sometime in the near future.

» » » The derrick and hopper at the No. 2 millshaft of the Rialto Mining Corporation (destroyed by fire on August 3) have been rebuilt. The new structures are smaller than the previous ones—the hopper is only of 350 tons capacity. A first-motion hoist has been installed instead of the former electric unit. This was the

third fire suffered by this operation in five years.

Ore will be trucked to the company's No. 3 mill, as the No. 2 mill was destroyed by fire in February, 1942.

OHIO

» » » All papers submitted in the James F. Lincoln Arc Welding Foundation's \$200,000 Award Program of 1937-38, and the Engineering Undergraduate Award and Scholarship Program of 1942-43, have been placed with Ohio State University's A. F. Davis Welding Library, J. R. Stitt, associate professor of welding engineering, announced recently.

The papers add substantially to the wealth of welding information in this collection, one of the largest of its kind in the world, containing approximately 1,000 books on designing for welded construction, welding techniques and procedures, properties of weld metals, standard welding handbooks, metallurgy, also magazine articles, technical papers, patents and other literature contributing knowledge on the subject of welding.

Copies of some 7,000 patents concerning welding equipment and the patented applications of welding to products or structures are now on file. This library is rapidly becoming one of the most extensive reference collections available in the Middle West from which patent researchers in the field of welding can obtain important information.

Engineers, industrial designers, technicians, production men, shipbuilders, and others interested in research or general information on welding and its application to construction, manufacture or maintenance of metal structures are welcome to use the facilities of this library.

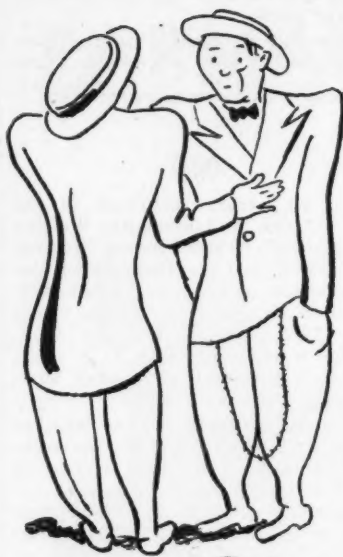
The library was presented to the university in 1942 by an alumnus, A. F. Davis, vice president of The Lincoln Electric Company, Cleveland, who was graduated in the class of 1914. He selected Ohio State University for the gift, it is said, because it is the only university in the country that offers a four-year course in welding engineering.

The library is located in the Industrial Engineering Building, Ohio State University, Columbus, Ohio, which houses the Industrial Engineering Department.

» » » The Bituminous Coal Institute held an invitational forum meeting of sales executives of member companies at the Statler Hotel in Cleveland, September 18. The entire public relations campaign for the



Skimmer scoop with large stripper in background at Alston Coal Co. operations near Pittsburg, Kans.



"But if Ickes ISN'T a hepcat, why do they call him the 'solid' fuels administrator?"

furtherance and betterment of bituminous coal use was discussed.

M. L. Patton, vice president, Truax-Traer Coal Company was chairman and Harry M. Vawter, director of the Institute introduced the various phases of the work being conducted, giving the background and explanatory details.

The speakers were: Maurice Mermey of Baldwin and Mermey, public relations counsel for the Institute, who discussed the public's misconceptions of sociological and utilization aspects of the industry; Spencer Armstrong, assistant to Mr. Vawter, who outlined the numerous phases of publicity and information service being extended to editors, speakers, etc.; Clarence Goshorn, president, Benton & Bowles, advertising agency, reviewed the Institute's objectives in raising the stature of the bituminous coal industry in the public mind; Harold F. Douglas, vice president, Benton & Bowles, explained details of the Institute's present contest among architects for "Flexible Heating" to stimulate the specifying of chimneys of ample size to accommodate all fuels; and Neal Nyland of Benton & Bowles discussed a special new advertising campaign in trade magazines to aid retail coal dealers.

Discussions followed each presentation and numerous adaptable suggestions were brought out. The meeting was the first of a series to improve the post-war promotion of all phases of the bituminous industry.

» » » In recognition of outstanding contributions to ordnance progress, the War Department presented Battelle Institute, Columbus, Ohio, the Ordnance Distinguished Service Award at a presentation ceremony held at Battelle on September 22.

Citing the Institute's research on numerous other subjects, Major General C. T. Harris, Jr., commanding general of the Aberdeen Proving Ground, presented the award on behalf of the War Department. Clyde Williams, director of Battelle, received the citation on behalf of the Battelle staff.

Dr. Frank B. Jewett, president of the National Academy of Sciences, chairman of the board of the Bell Telephone Laboratories, and vice president of the American Telephone and Telegraph Company, acted as principal speaker for the occasion.

ILLINOIS

» » » The third biennial National Chemical Exposition and National Industrial Chemical Conference will be held at the Coliseum in Chicago, November 15 through 19. The show is sponsored by the Chicago Section of the American Chemical Society and will be of value to a vast cross-section of interests especially those people holding technical and management positions.

» » » The Sixty-second Coal Report (1943) of the Illinois State Department of Mines and Minerals has been issued by Robert M. Medill, Director, of Springfield and Robert Weir, Asst. Director, of Ziegler. The report covers the work of the 14 coal district inspectors, two inspectors at large, two economic investigators and the fluorspar inspector.

During the year, 141 shipping mines produced 68,971,621 tons of coal while 344 local mines produced 4,373,140 tons for a total increase of 11 percent over 1942 with 200 fewer local mines but the same number of shippers. Average days worked increased from 144 to 181 for an increase of 24 percent. Number of men employed decreased 8 percent.

Machine mining has increased steadily in tonnage in recent years with a decrease both in severity and frequency of mine accidents. Much additional comparative data are included.

Strip mining represented 18 percent of the number of operations, employed 11.9 percent of the men and produced 22 percent of the product of the shipping mines.

» » » 247,214 tons of fluorspar were produced by 19 mining companies employing 1,431 men in Illinois during 1943. Five operators produced 80,925 tons of zinc and lead ore.

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with
SECTIONALIZING CIRCUIT BREAKERS

When a mine is sectionalized, an electrical disturbance is confined to the area in which it starts. Operation of mining, loading and haulage equipment in other areas is never penalized.

In the local area, where disturbance has arisen, power is restored at full voltage at the instant the fault has been cleared. Not a second of needless loss occurs.

The aid to operating continuity is great. There are mines where sectionalizing has added as much as 10% to daily tonnage.

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Reclosing Circuit Breaker*




I-T-E

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Representatives in Principal Mining Areas

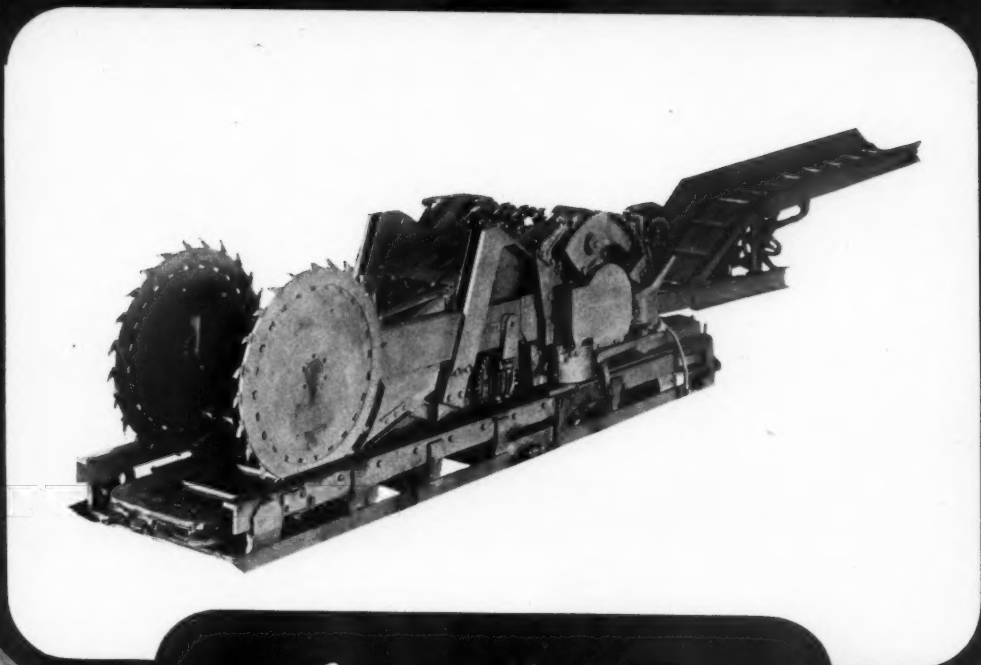
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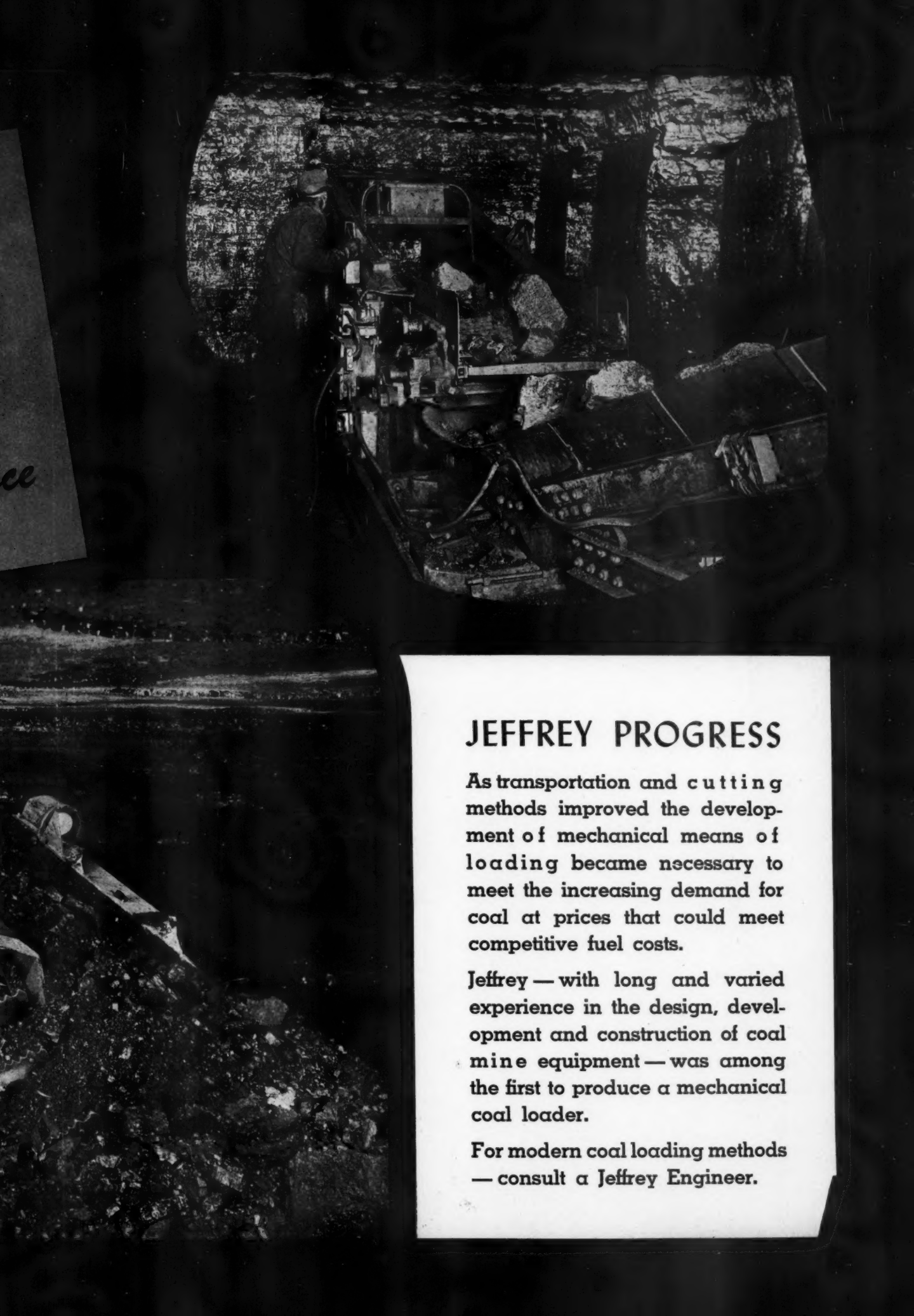


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*marks an outstanding advance
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As transportation and cutting methods improved the development of mechanical means of loading became necessary to meet the increasing demand for coal at prices that could meet competitive fuel costs.

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For modern coal loading methods — consult a Jeffrey Engineer.

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British Jeffrey Diamond Ltd.
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Jeffrey-Galion (Pty.) Ltd.
Johannesburg, S. A.

MINNESOTA

» » » Clyde Iron Works, Inc., of Duluth was acquired by Barium Steel Corporation of Canton, Ohio, on August 30. No public financing was involved. J. A. Sisto, chairman of Barium Steel and its president, Rudolph Eberstadt have been elected chairman and president respectively of Clyde Iron Works. C. A. Boesel, former secretary and treasurer is now vice president and treasurer. R. C. Hardy is secretary. All of the directors of Barium Steel are now directors of Clyde Iron Works, Inc. C. A. Luster and J. R. McGiffert remain in an advisory capacity.

Postwar Engineer Training

Post-war technical and engineering jobs will be more plentiful than adequately trained men and women to fill them, say college placement officials participating in a survey by Northwestern National Life Insurance Company, of Minneapolis, Minn.

Trainees of Army and Navy "condensed" technical courses may be in oversupply, and will need further training in order to compete with regular engineering graduates. A number of colleges are already planning post-war courses that will round out and complete the professional schooling of such trainees.

Removal of draft deferments from engineering students almost completely shuts off the new supply of graduate engineers and technicians, placement authorities point out; the longer we are at war from here on, the greater will be the post-war shortage of such personnel.

"The post-war market for technically trained men and women should be good for many years because of the vast amount of construction work which must be done to rehabilitate the countries now torn by the implements of war," is the comment from Temple University. Rose Polytechnic Institute: "Demand should be excellent, due to wartime curtailment of civilian (and military) engineering training, and the tremendous probable need for engineers after the war." Stanford University's School of Engineering: "Expect a shortage of well-trained men; a surplus of partially-trained and below average technical men."

"There are so few now graduating and enrolled in engineering that we expect the demand for technically trained men and women to far exceed the supply for the first two or three years of the post-war period"—University of New Hampshire.

"Demand should absorb the available supply for a time; then there will probably be a surplus due to the large

graduating classes which will follow in two or three years after the war. After which supply and demand will probably fall into normal equilibrium, except in a few specialized fields."—College of Engineering, University of Illinois.

"Now that 98 percent of our civilian engineering students are drafted, am certain there will be a very great unfilled demand for technically trained men. It will require a number of years to catch up with this need."—College of Engineering, University of Idaho. "After industrial changeovers to civilian products are made, demand for technically trained personnel will exceed supply."—College of Engineering, Marquette University. "Some of the partly trained people are likely

to be disappointed in post-war competition with those who are fully trained."—Princeton University School of Engineering.

Of 54 engineering and technological schools participating in the survey of post-war employment prospects for technically trained men and women, the placement officials of 38 were definitely optimistic, four felt that the supply of personnel would just about balance the demand, three felt that there would be an oversupply of technically trained persons compared with the opportunities available, five qualified their answers with references to various economic factors difficult to predict, while four felt that future prospects were so uncertain that they declined to make any predictions.

Shot-Firers Know—

That they can tamp **FASTER—SAFER—**
and **BETTER** with **SEALTITE TAMPING**
BAGS.

Operators Have Found—

That **BAGS** reduce tamping-time costs
and increase coal brought-down per
shot — more than offsetting the cost of
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Of mine supplies—in every mining district — can give complete service information—or write us direct.

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COLORADO

» » » A number of improvements have been made at the Shoe Basin mine of the Pennsylvania Gold and Silver Mines, Inc., at the foot of Argentine mountain in Summit County, near Montezuma. A new compressor house has been built and a new gasoline-driven compressor installed. Snowsheds and other buildings have been erected. A new mucking machine has been purchased for the mine. Some 1,500 tons of mill-grade ore carrying values in lead, zinc and copper have been stock-piled since commencement of work last winter.

» » » Concrete bases for new machinery to be installed this fall have been completed at the Highland Mary mill in Cunningham Gulch. A ball mill has arrived for immediate setting up. Switchover to a new flowsheet will be made after all new equipment is in place. Increased capacity several times over that now available will result, as well as better recovery. The new mill will have a completely up to date selective flotation flowsheet.

ARIZONA

» » » Reports from four Gila County properties made in Globe, tell of a three-ton daily average output for the Regal mine of the Arizona Chrys-

otile Asbestos Company, located on the Salt River, 50 miles east of the county seat. The mine products are being used in the production of oil filters for ships now under construction on the west coast.

J. A. Guldin is shipping 60 tons of copper ore regularly every two days from the old Superior and Boston properties on Copper Hill, to lower Miami.

Rudy Keller, of the Falcon Mining Company, Claypool, and Chris Mueller, Globe, are mining manganese from a black oxide claim lease. The output is trucked to the stockpile in Phoenix.

The Wright and Maxwell asbestos mine, part of the old Triangle group located near the U. S. highway 60 miles northeast of Globe, has been taken over by Floyd Brown, Globe.

» » » Purchase of the old Keystone mill in Mineral Park, Mohave County, by L. L. Robinson, Los Angeles, Calif., and that it will reopen to accept ores of the district, has been announced in Kingman. Custom ores from Cerbat, Mineral Park, and Chloride will be accepted at once. Other mines in the area, notably the Silver Hill, are expected to reopen as a result of the deal. The Keystone mill has been inactive since operated by the Ward interests.

» » » The Tennessee zinc-lead property in Mohave County has gone on a six-day work week. An average of 100 tons daily are being milled from the mine ores.

» » » Mid-November is expected to see the completion of a new dam on the Black River, in the White Mountain Indian reservation, to impound water for mining operations at the Phelps Dodge Corporation open pit mine at Morenci.

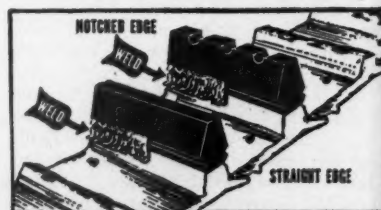
Total cost of the dam will run more than \$300,000. Its spillway will run 180 ft. in length, and a rock fill will protect it on both sides. Five large pumps are to be installed to utilize the stored water.

The project is located 85 miles north of San Carlos, and is reached by a forest service road.

» » » A comprehensive survey of the long-fibre asbestos deposits in the Globe area, prompted by the increasing demand for the product, has been made by representatives of the Federal War Production Board. The surveying party comprised Utey W. Smith and S. L. Mathewson, Washing-



Loading iron ore at the Columbia Iron Mining Company pit at Cedar City, Utah. Ore is shipped to the Geneva, Utah steel plant



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ton, D. C., chief and deputy director respectively of the WLB cork and asbestos division; C. M. Heron, Salt Lake City, Utah, consultant of the WLB mining division; and Travis Lane, Phoenix, supervising engineer of the Reconstruction Finance Corporation.

» » » Lowering of ore grades would preclude the nation's mineral areas reacting as readily to a wartime emergency 25 years hence as they have in the present crisis, it is said by Dr. T. G. Chapman, director of the Arizona Bureau of Mines at the University of Arizona.

Arizona herself is an example of lowering ore grades throughout the nation, he said. "During the past four years Arizona produced 9 percent more copper than in the four years of World War I, but had to treat 95 percent more tonnage," he said in illustration of how ore grades are dropping.

"Because iron ore, high grade aluminum ore, and petroleum will have to be obtained from lower grade sources, we probably cannot produce metals so readily in another period of emergency."

"It is desirable to freeze our excess stocks of strategic minerals and metals, including non-ferrous scrap at the end of this war. The frozen minerals and metals would be released only by an act of Congress and only in the event of a war emergency."

UTAH

» » » Construction of a new sulphuric acid plant of 150 tons capacity at Garfield, Utah, by the Garfield Chemical and Mfg. Corporation, a subsidiary of American Smelting & Refining Company and Utah Copper Company, is announced by William J. O'Connor, Utah manager of the smelting company.

The plant, to cost \$1,000,000, will provide for markets requiring 150 tons daily in addition to the 100 tons per day now being produced by the original plant. Construction work on the new plant has already started and its completion should require about ten months. The project has been approved by the War Production Board.

New outlets for additional acid will be the Geneva Steel plant, the newly completed high-octane plant of the Utah Oil Refining Company at Salt Lake City, the superphosphate plant now under construction at Pocatello, Idaho; for the Simplot Corporation, and other consumers in California.

The Simplot plant will use acid in processing phosphate rock from Conda, Idaho, underground mines of the fertilizer division of Anaconda Copper Mining Company. The new Garfield plant will apply the same

general chemical methods for producing the acid as are employed in existing plants.

MONTANA

» » » The Coeur d'Alene Extension Mines Company has purchased a fluor spar property near Superior, Mont., from Joe Brooks, a Sunshine miner who discovered the prospect while looking for a copper outcrop. The mineral is a clear white crystal and is said to assay 98.4 percent CaF_2 . U. S. Bureau of Mines geologists have been examining the discovery for several weeks. The Coeur d'Alene Company is building a road to the mine and installing an air compressor and other machinery. The management states sacked shipments will be made direct from the surface outcrop, which is reported to be some 30 ft. wide. The mineral is said to be worth \$42 per ton f.o.b. Superior, Mont.

NEVADA

» » » Development of a copper-producing district of first importance in northern Elko County is believed in immediate prospect as the result of new activities in the Mountain City, or Cope, district, where deep churn drilling is in progress on property of the Mountain City Consolidated Copper Company. U. S. Bureau of Mines engineers are conducting an extended geophysical survey of the district. The survey covers the western extension of the broad copper belt from which a large pro-

duction has been made by the Rio Tinto mine in late years.

» » » Out of the conference of governors held at San Francisco in August came many suggestions seeking to benefit the mining industry. Western governors, or their representatives, were in attendance, the conference being called by Gov. E. P. Carville of Nevada. The conference adopted a post-war program calling for use of silver and gold as a monetary base; orderly transfer of defense plants to private operators; prompt revision of income tax laws, and the freezing of metal stockpiles; and declared the WPB order shutting down gold mines "never was justified," and the WPB directive citing gold mines as "non-essential" also came in for criticism. Full text of resolutions appeared in the September MINING CONGRESS JOURNAL.

» » » A mercury plant of special design, employing certain patented features, is being fabricated by the Gardner Mfg. Company of Oakland, Calif., for early installation at the Blue Bucket cinnabar mine in the Bottle Creek district in central Humboldt County.

» » » Nevada State Mine Inspector Matt Murphy stated recently that nearly 100 operators of mines, mills and smelters in this state have been forced to suspend operations during the last year, due to a growing manpower shortage, coupled with Federal control. A majority of the closed properties were those of small operators.

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- Internally lubricated
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Manufacturers of MACWHYTE PREformed and internally lubricated Wire Ropes — MONARCH Whyte Strand Air-Rope — MACWHYTE Elevator Wire Ropes — MACWHYTE Braided Wire Rope Sling — MACWHYTE Aircraft Cables and Tie-Ropes — Mill Decott, New York, Pittsburgh, Chicago, St. Paul, Portland, Seattle, San Francisco — Distributors throughout the U. S. A.

MONARCH Whyte Strand
PREformed ... Macwhyte's
best grade wire rope... famous for its strength, toughness, and internal lubrication.

NO. 725-H

Mining company payrolls have been reduced in the year from 11,425 employees to 7,994. Murphy looks for a mining boom as soon as gold mining is able to resume and capable mining men can be had.

IDAHO

» » » The Chester vein system, recently discovered in the deep workings of the Sunshine mine, has now been proven for an east and west distance of over 1,000 ft., all of which is productive territory. According to the company's last statement, head assays on the mill feed from this vein during the first six months of this year averaged 7.56 percent lead and 40.74 ozs. in silver per ton. Net returns received for concentrate shipments to the Bunker Hill smelter for the six months' period totalled \$2,082,255.32. Sunshine, Polaris, Silver Syndicate and Silver Dollar mining companies all participate in the profits of this operation through extralateral rights agreements.

» » » Independence Lead Mining Company has declared a dividend of 750,000 shares of Clayton Silver Mines stock to Independence stockholders on a basis of one share of Clayton for four shares of Independence Lead holdings. This leaves the Independence company holding 250,000 shares of Clayton stock. The stock dividend has a market value of about \$375,000. Clayton has paid dividends this year amounting to \$45,000 and a total to date of \$240,000. The stock dividend to Independence owners does not involve surrender of any Independence Lead stock.

» » » The Highland-Surprise Mining Company, operating a zinc-lead property in the Pine Creek area, has declared its maiden dividend of 12½ cents per share, or a total of \$123,704.50 and is payable October 15 to stock of record September 15. This is the first company in the Pine Creek district to pay a dividend.

» » » The Mackay Exploration Company at Mackay, Idaho, has been shipping crude copper ore to the smelters for the past several months, pending installation of an RFC-financed milling plant, which went into operation last week. The company employs 30 men and expects to double the crew as soon as manpower is available. The mine is the old White Knob copper property, a large producer in earlier days.

» » » U. S. Bureau of Mines engineers doing diamond drill prospect work on the Nevada-Stewart property on Pine Creek, have located three separate zinc-lead veins about

80 ft. apart. One of the veins is said to show commercial values for a distance of 400 ft. from drill holes spaced 100 ft. apart. Width of this vein is reported from 8 to 12 ft. with 30 in. of high grade following one of the walls.

» » » Federal Mining & Smelting Company, acting as agents for the A. S. & R., has started sinking a prospect shaft at the Highland-Aurora property in the Beaver district north of Wallace. It is proposed to sink the shaft to a depth of 1,000 ft.

CALIFORNIA

» » » It is reported that the Mine Workers' Protective League and the operators of the Empire Star mines, Idaho Maryland mines and Spring Hill have signed a two-year contract. Under the new agreement, the miners will receive a wage of \$6.74 a day which will be raised to a minimum of \$8.04 a day in the event of a market increase to \$50. A total of almost 600 men is employed at the mines mentioned.

» » » The Empire Star Mines Company, Ltd., is reported to be milling some 200 tons of gold ore per day at the North Star mine at Grass Valley. A crew of about 150 men is employed as compared to 800 men before the gold closing order.

Special permission by WPB was granted earlier in the year to continue limited operations to meet maintenance costs. Prior to the shutdown order, 800 tons of ore per day was treated. The company maintained the property and paid two 50-cent dividends during 1943 but will suspend payments this year pending an improvement in its financial condition.

Golden Jubilee Meeting Northwest Mining Association

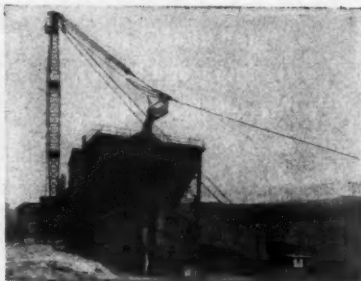
December 1 and 2 are the days set for the annual meeting of the Northwest Mining Association at Spokane. The Association was organized 50 years ago.

The meeting will feature a number of well known speakers on mining subjects and will represent an important milestone in the work done by the Association over a period of half a century.

Costs Reduced



Above picture shows a 6-cu.-yd. Sauerman Scraper operating on a 450-ft. radius handling a 200,000-ton stockpile at a mine.



This Sauerman Slackline Cableway spans a waste pile 1,000 ft. wide and moves culm from pile to hopper on top of briquetting plant.

By Handling Materials the SAUERMAN Way . . .

Strip mining, open pit and stockpiling jobs involving hauls of 100 to 1,000 ft. or more, often are greatly simplified by using a SAUERMAN Power Scraper or Slackline Cableway which digs, conveys and places the materials in one operation.

First cost of a SAUERMAN Machine is reasonable, maintenance expense is small and one man easily handles the operation.

Moreover this equipment is very flexible; is readily adapted to meet any new working conditions or production demands. The range of sizes is large, offering hourly handling capacities from 10 to 600 tons.

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540 S. CLINTON ST.

CHICAGO 7, ILL.



A Wartime Coal Development

(Continued from page 25)

Ventilation Offers "Air Tempering"

The ventilation will be by a Jeffrey 8-ft. Aerodyne fan set over the air shaft located about 100 yds. from the main slope. Following the usual Illinois custom the fan will operate as a blower with exhaust air from the mine coming out of the main slope. This arrangement is admittedly controversial as far as some other fields are concerned but it has proved highly satisfactory in Southern Illinois where particular attention is given to having a sufficient volume of air for ventilation so that the final return circuit conforms to all safety specifications.

An unusual and unique feature in connection with the ventilation discharge is that a small quantity of the return circuit will be diverted from the slope for "air tempering" some of the surface buildings. As the mine temperature, with slight seasonal variations, is usually around 65 deg. the exhaust will serve as a cooling agent in summer and in winter will raise the temperatures of the buildings so that heating will be made much easier and the buildings more comfortable. Air ducts are planned to lead to the rope hoist engine room, to the room where men wait for man trips and probably to the repair shop.

Surface Buildings and Grounds Offer Complete Modern Services

The surface plant is very attractive, all buildings being constructed of concrete tile made of chipped limestone that gives an almost white, or at least a very light grey color. The shop buildings in the immediate vicinity of the plant consist of engine room and waiting room, located directly over the slope opening, the wash house, main repair shop and scale house at the end of the tippie yard where railroad cars will be weighed. Provision for truck loading will be made at the tippie and the scale house also has a platform scale for weighing the trucks. Water lines and complete sewerage system take care of all sanitary conveniences for the shops and other buildings and an artificial lake near the plant site will provide water for the wash house and other purposes. No dwellings are being constructed but a large parking lot is provided for automobiles.

At another plant of the company about a mile or so distant from the slope, an old power house is being remodeled for a large central machine shop and supply house. This will be used primarily for major repairs and complete machine overhauled; the

minor and smaller repairs as needed daily will be made at the plant shop located near the slope.

Electric cap lamps are of course used throughout the mine and the lamp house is the "self-service type" where each man at the end of the shift places his lamp battery in the rack and plugs into charging terminals.

The design and ideas set forth at this property represent the combined efforts of the following technical personnel: C. C. Conway, Electrical Engineer; Rollie Cravens, Superintendent; G. S. Jenkins, Mechanical Engineer; J. H. Kuehner, Construction Engineer; Hugh Mercer, Civil Engineer; and F. A. Miller, Mining Engineer.

The driving of the slope, construction and erection of plant facilities,

together with the installation and adaptation of the various items of equipment from individual manufacturers, was performed by employees of the coal company and supervision was by the technical staff listed above.

ARE YOU DOING IT?

Every pound of paper that gets back into packaging cartons and boxes will contribute to manpower saved in cutting, "toting" and shredding trees. Our mills need this material to package the fighting supplies so necessary to the big fight we're all trying so hard to win.

Save Paper!

BOOK REVIEWS

THE MINING INDUSTRIES, 1899-1939: A Study of Output, Employment and Productivity. By Harold Barger and Sam H. Schurr, National Bureau of Economic Research, New York, N. Y. 1944.

This 452-page economic study of the mining industries offers new indexes of output, using prices as weights and expresses the mine value at the point where the mineral product goes to the smelter. In this connection, ore dressing is considered a part of the "mining industry" but smelting and refining fall under the head of "manufacturing." Employment data are given in man-days instead of in numbers of workers in order to present a more concrete picture.

Factors influencing output trends are given some prominence, such as the increasing importance of scrap metal, improved coal combustion techniques and the substitution of concrete for natural building stone. Detailed and valuable analyses are made of coal mining, iron mining, copper mining, stone quarrying and production of oil and natural gas.

The book shows the four-fold increase in mineral production during the period, with fuels and non-metals showing a faster growth than metals. Employment in fuels production expanded 17 percent while metal mine employment decreased 24 percent and non-metal 18 percent. Overall increase was 5 percent, with a significant change in ratio of salaried workers to wage earners from 1:15 in 1902 to 1:10 in 1939, reflecting increased mechanization and the mounting burden on the management of modern productive processes. The mining industry (as defined in the book) is reported to employ about 2 percent of the nation's workers and produce less than this percentage of the national income.

The coal industry is stated to have been slow in technological advance because of the piece-rate system and intermittent operation. These factors discourage investment in labor-saving equipment.

The book is one of a series of studies to measure output and productivity in different industries. Transportation, public utilities and other groups will be treated in future.

MICROMERITICS. The Technology of Fine Particles. By J. M. Dalla-Valle, Pitman Publishing Corporation, New York.

The author has proposed a new scientific term, derived from the Greek words meaning "small" and "part," to cover the numerous useful and interesting phases of the behavior and characteristics of small particles. The book gathers together, in well arranged form, the information on methods of particle measurement, size distributions, packing arrangements, and general theory concerning the physical properties of finely divided substances.

Mining engineers, especially those engaged in mineral dressing and coal cleaning, or in dust studies, will find considerable rationalizing assistance within the pages of this excellent volume. 18 chapters, a four-part appendix, excellent bibliography, 428 pages.

THE 1944 edition of National Fire Codes for the Prevention of Dust Explosions, covering coal pneumatic cleaning plants and pulverized fuel systems as well as numerous other items is announced by National Fire Protection Association, 60 Battery-march Street, Boston, Mass.

MANUFACTURERS FORUM

New Explosion-Proof Battery

Development of an explosion-proof storage battery which the Navy Department designed and worked out with the Philco Storage Battery Division to put into mass production for urgent war uses, was announced recently. It has been predicted that its use in electric industrial trucks will revolutionize current methods of material handling in government depots and manufacturing plants where any fire or explosion hazard exists.

M. W. Heinritz, vice president in charge of the Storage Battery Division, has stated, "The design of the explosion-proof battery compartment is completely new. Any storage battery normally discharges a certain amount of gas during its duty cycle, and the construction of the explosion-proof compartment is such that an air cylinder discharges into the space above the battery itself at a predetermined rate so that as the air and gases from the battery exhaust to the atmosphere, the mixture will be so diluted as to be non-combustible.

"In order that the entire assembly will be fool-proof, the design is such that when the locking handle on the battery compartment lid is thrown to the open position, electric switches disconnect the battery, electrically, from the truck or truck motors.

"Thus after the truck leaves the battery-charging station, all of the component parts are locked shut and cannot be opened until the truck is returned to the station."

A. B. Farquhar Co., York, Pa., makes the steel battery cases and assembles the complete unit.

Announcements

The Eimco Corporation has added a new branch office in St. Louis, Mo., in the Paul Brown Bldg. James K. Rusel is manager.

F. R. Marlier, president of the Portable Lamp and Equipment Co., Pittsburgh, Pa., announces the appointment of C. Leslie Jamison as vice president in charge of sales for the Strauss Company Division of the company, which manufactures a complete line of safety hats and caps, safety belts and harness, and other types of accident prevention equipment.



New storage battery is inspected by (left to right) M. W. Heinritz, vice president, Philco; Lt. R. T. Tiebout, U.S.N.R.; Capt. J. C. Byrnes, U.S.N.; W. J. Fisher, president, A. B. Farquhar Co., York, Pa.; and E. E. Rouscher, superintendent Farquhar Company

New Link-Belt Dryer

A new type of dryer, the Multi-Louvre Dryer, is announced by the Dryer Division of Link-Belt Company, 300 West Pershing Road, Chicago, for the low cost drying (or cooling) of bulk materials which do not require long retention periods.

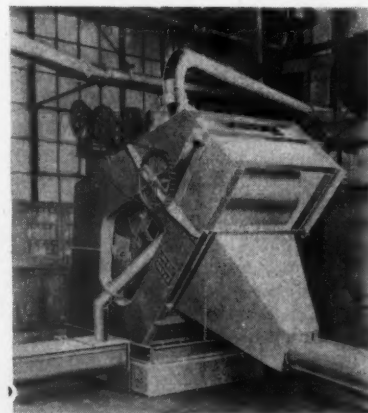
The new dryer is described as a very compact, fully enclosed unit, containing moving louvres supported on power-operated endless chains. The function of these moving louvres is to present the material as it flows, to secure the most efficient drying (or cooling) action.

This mixing action and thorough contacting of the material with the heated air introduced into the unit is said to promote efficient drying and assure a uniformly dry material. The air which is drawn in through the moving mass of material and exhausted at the top of the dryer can be heated to the temperature best suited to the material being dried. Ample passages between louvres permit air circulation at low velocity.

Fine materials can be carried on

the louvres without clogging. The louvre-supporting chains are not in the path of the heated air, neither do they come in contact with the material being dried. This should result in longer life of the moving parts.

The new dryer is covered by a four-page illustrated folder No. 2009, which also shows the three other types of dryers Link-Belt builds.



The New "Powerclad" Battery

The Electric Storage Battery Company has made available a new Exide-Powerclad battery. This supplements the production of Exide-Ironclads to relieve shortages. It is said to be designed to meet the most exacting requirements encountered in motive power service. The battery is the result of 12 years of research devoted to developing a specific battery for motive power requirements.

The Powerclad embodies a special design of the positive assembly. It is a plate completely enclosed by a slotted polystyrene retainer. In combination with the separators, this assures effective retention of the active material, and provides rapid diffusion of the electrolyte. This assures long life and capacity discharges at usable voltages throughout the life of the battery.

New Mack District Managers

Three new district managers have been announced by F. F. Staniford, president of Mack-International Motor Truck Corporation.

Northeastern Division: E. W. Turnbull, district manager of the Akron Branch; E. W. Atherton is district

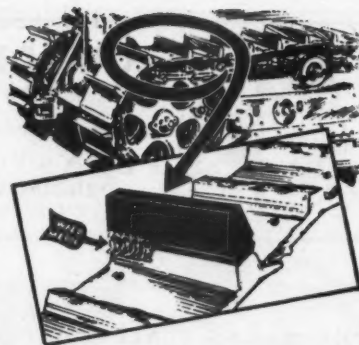
manager in the Albany Branch. In the Southern Division, J. A. Bascle is district manager of the New Orleans Branch. Appointments effective July 1.

New Tractor Grip-Lug to Salvage Old Worn Grouser-Shoes

A recent development of the Allied Steel Products, Inc., Cleveland, Ohio, is their Bulldog brand tractor grip-lug.

It is now unnecessary to tear down the track assembly and replace the worn grouser-shoes with new parts, when a simple repair operation will restore the "gripping power" of the track. This is reported to be accomplished merely by welding on to the old grouser-shoe a specially designed steel bar, with a groove and bevel to facilitate laying welding bead along the edge which holds the bar and the grouser-shoe together as in a vise. The material is a special analysis, work-hardening steel, which gets harder and tougher with use, and often outlasts the original grouser.

Over 80 percent of the metal of the old shoe is thus salvaged, releasing that much critical metal for ur-



gent government needs. Meanwhile, the contractor has put his tractor back into good condition, at considerably less replacement cost and without delay. New and informative literature, describing the material and methods of application, free upon request.

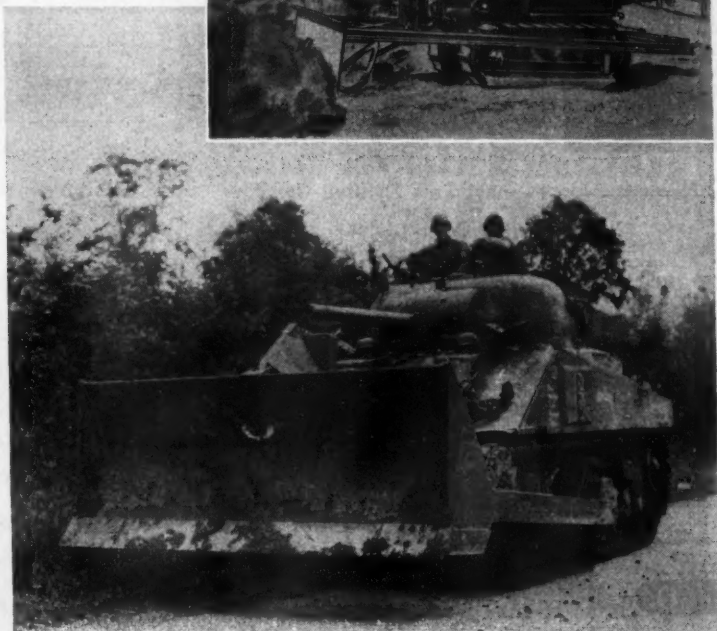
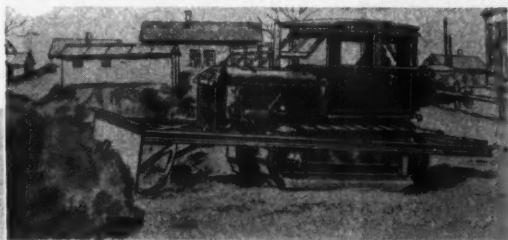
New Spot Welding Timer and Heat Control

Suitable for welding small objects of high conductivity such as aluminum or copper, a new precise welding timer with heat control for timing intervals of one-half cycle or less is announced by Westinghouse Electric and Manufacturing Company.

Precise, because the welding current is made to start at the same point on the voltage wave for every operation, the new SP-18, one-half cycle timer is designed for welding of such items as radio tube parts and sockets, pig-tail resistors to terminal lugs, watch and instrument parts, contact tips on electrical relays and other small parts, it is reported.


The timer is furnished as a separate control for use with existing small bench welders and also in combination with a small welding transformer. Only one control tube is used, this thyatron serving the dual purpose of rectifying alternating current to charge a firing capacitor and also firing the small ignitron power tube. Heat control is accomplished by a phase shift method, the adjustment dial for which is mounted on the cabinet door.

Further information on this timer, may be secured from Department 7-N-20, Westinghouse Electric and Manufacturing Company, E. Pittsburgh, Pa.



The Army's 40-ton M-4 "tank-dozer" is the weapon that broke through the hedgerows of Normandy and spearheaded the Allies' spectacular dash across France. It carries a hydraulic operated B-8 LaPlant-Choate bulldozer blade mounted on a Sherman tank. The bulldozer has long since become a familiar tool in numerous mining operations. Insert: LaPlant-Choate's first commercial bulldozer, 1923





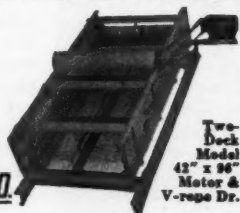
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